Interactive Media Seminar

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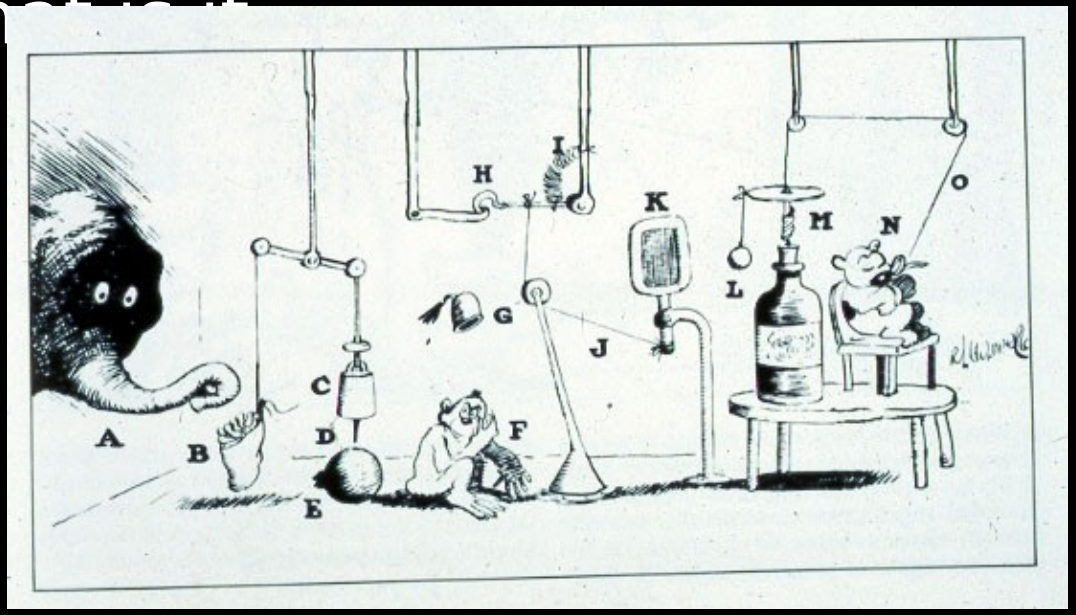
CTIN 511 Fall 2004
Interactive Media Division
USC School of Cinema-Television

Objectives – 1

- Fundamental Principles of Interactivity
  - Wh



Objectives - 2

- Overview of Works in Interactive Media Art & Technology
  - Emphasis on Virtual “Environments”
  - Survey of Application Areas
  - Analysis of Design requirements
  - Introduction to Production Process

Viewpoints on Interactivity

Interactivity:
Traditional Approach

- “Formally stated, interactivity is an expression of the extent that in a given series of communication exchanges, any third (or later) transmission (or message) is related to the degree to which previous exchanges referred to even earlier transmissions. “

  (Rafaeli 1988, p. 111)

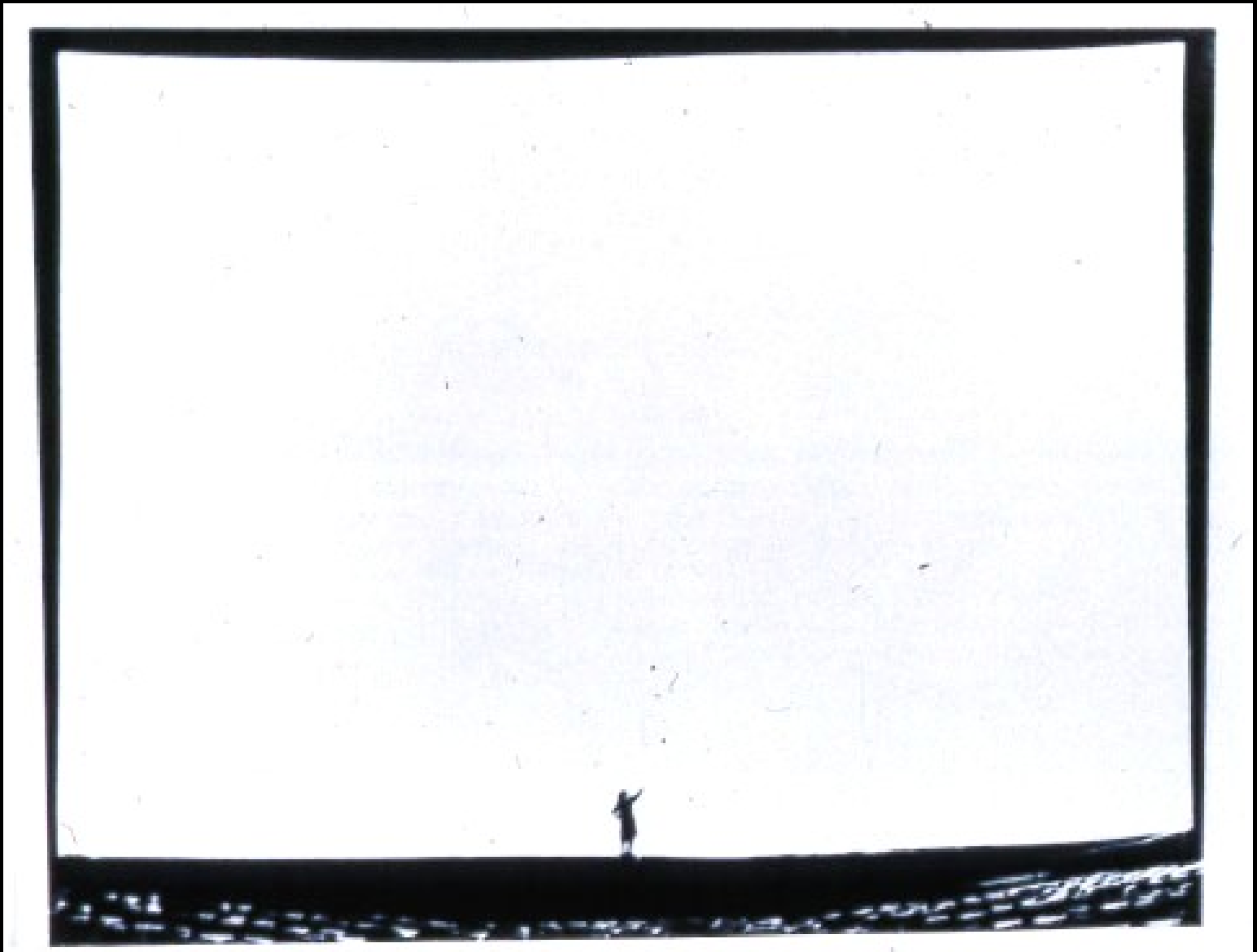
  (series of one-way transmissions of information through a channel)

1. Realness and Interactivity

M. Naimark (Media Artist)

- Realness = " Sense-ability"
  - Independent of input from real world or fantasy (virtual) world
  - Example: Imax movie
- Interactivity has to be two-way
  - Result of user's input changes the situation

  ("effectability- what our effecters affect")
  - Example: Videogames

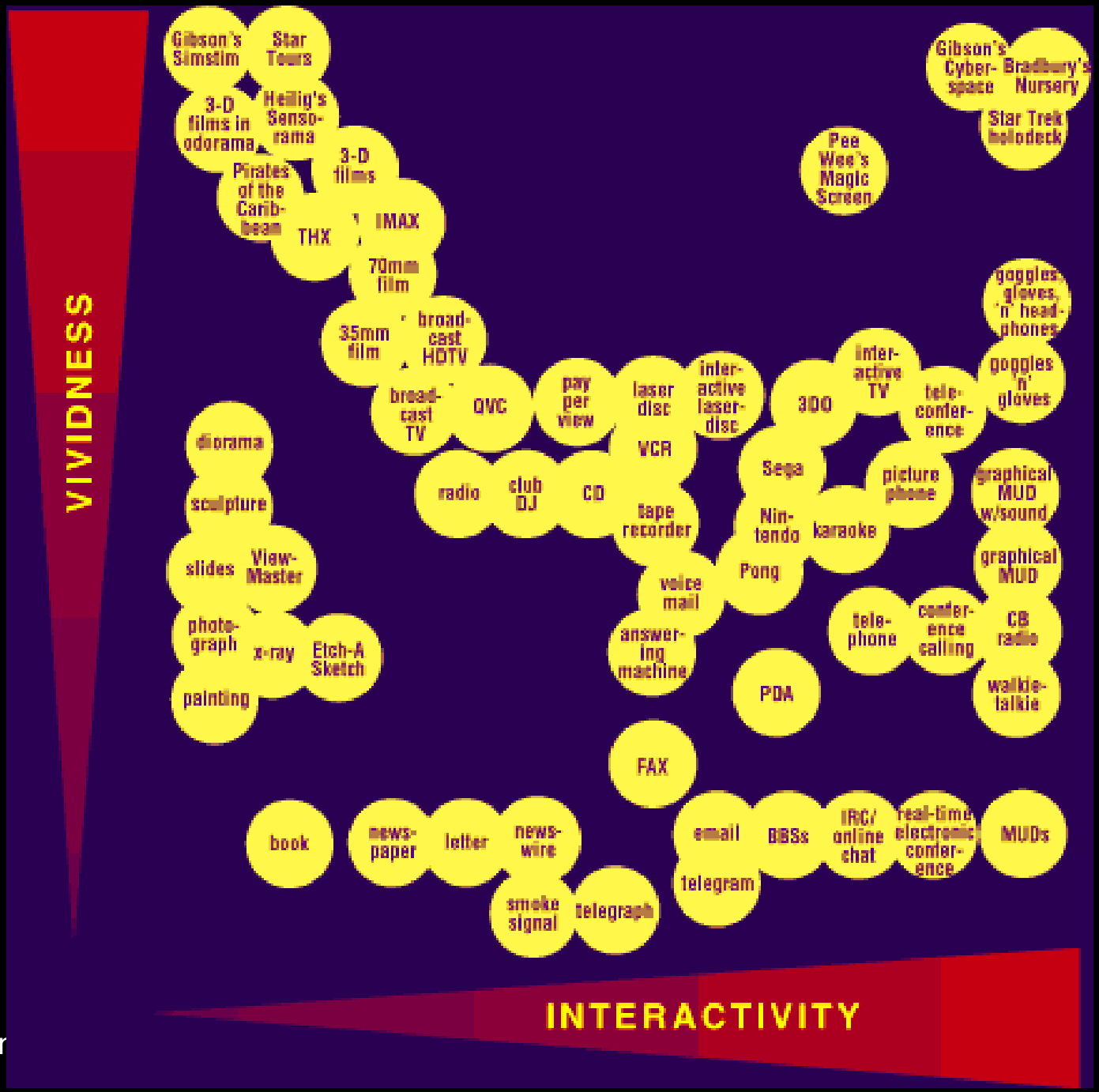


World's largest movie screen- over 7 stories high (IMAX theater in U.S. Pavilion,

2.1 Vividness vs. Interactivity

J.Steuer (Stanford 1995)

- Vividness and interactivity defined
  - vividness
    - -"the extent to which a mediated representation affects our senses in a manner similar to the way natural, real-world stimuli affect our senses.“
    - how realistic something looks, smells, feels, etc.
  - interactivity
    - the extent to which users can participate in modifying the form and content of a mediated environment in real time


VIVIDNESS
INTERACTIVITY
Gibson's Simstim
Star Tours
3-D films in odorama
Heilig's Sensorama
3-D films
Pirates of the Caribbean
THX
IMAX
70mm film
35mm film
broadcast HDTV
broadcast TV
QVC
pay per view
laser disc
VCR
interactive laser-disc
3DO
interactive TV
teleconference
Gibson's Cyberspace
Bradbury's Nursery
Star Trek holodeck
Pee Wee's Magic Screen
goggles, gloves, 'n' headphones
goggles 'n' gloves
diorama
sculpture
slides
View-Master
photograph
x-ray
Etch-A Sketch
painting
radio
club DJ
CD
tape recorder
Sega
Nintendo
karaoke
picture phone
graphical MUD w/sound
graphical MUD
voice mail
answering machine
Pong
telephone
conference calling
CB radio
walkie-talkie
PDA
FAX
book
newspaper
letter
newswire
smoke signal
telegraph
email
telegram
BBSs
IRC/ online chat
real-time electronic conference
MUDs

IM ser
4

2.2 Vividness vs. Interactivity

J.Steuer (Stanford 1995)

- Vividness and interactivity work together to make the experience of mediated environments seem like real life environments
  - Movies are more compelling than sound alone
  - High-definition, larger format media (THX, PanaVision) enhance this feeling

3. Definition of Interactivity

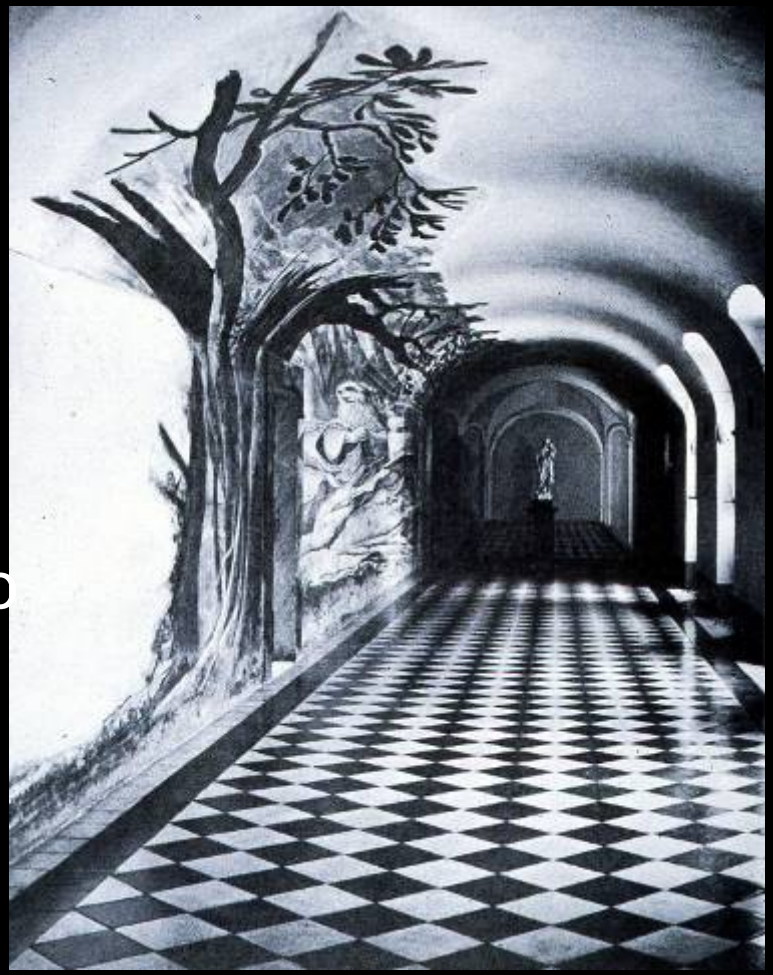
A. Lippman (MIT Media Lab)

- “Mutual and simultaneous activity on the part of both participants, usually working towards some goal, but not necessarily”
- 5 Corollaries:
  - Interruptibility
  - Graceful degradation
  - Maintaining the thread
  - Limited look-ahead
  - Maintaining the impression of an infinite database

Interactivity?

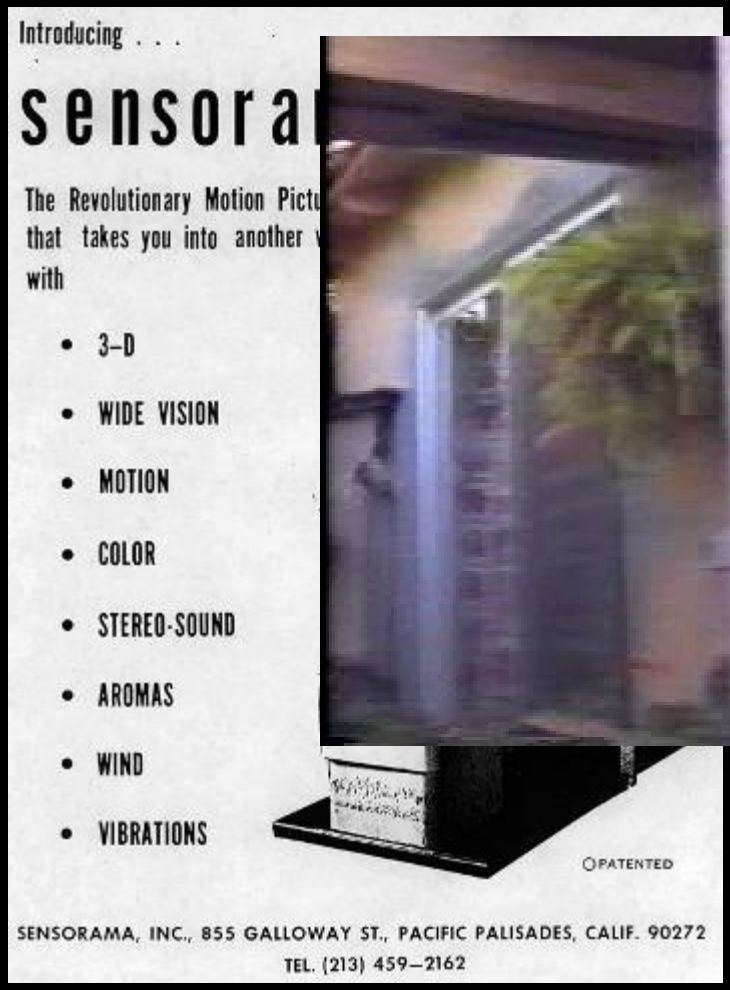
- What are the most interactive experiences you can think of?
- What are the most interactive devices you can imagine?
- What was important and/or interactive 100 Years ago?
- How do we measure interactivity?
  - (from Nathan Shedroff, Stanford Univ.)

Interactive Environments:
Background & History

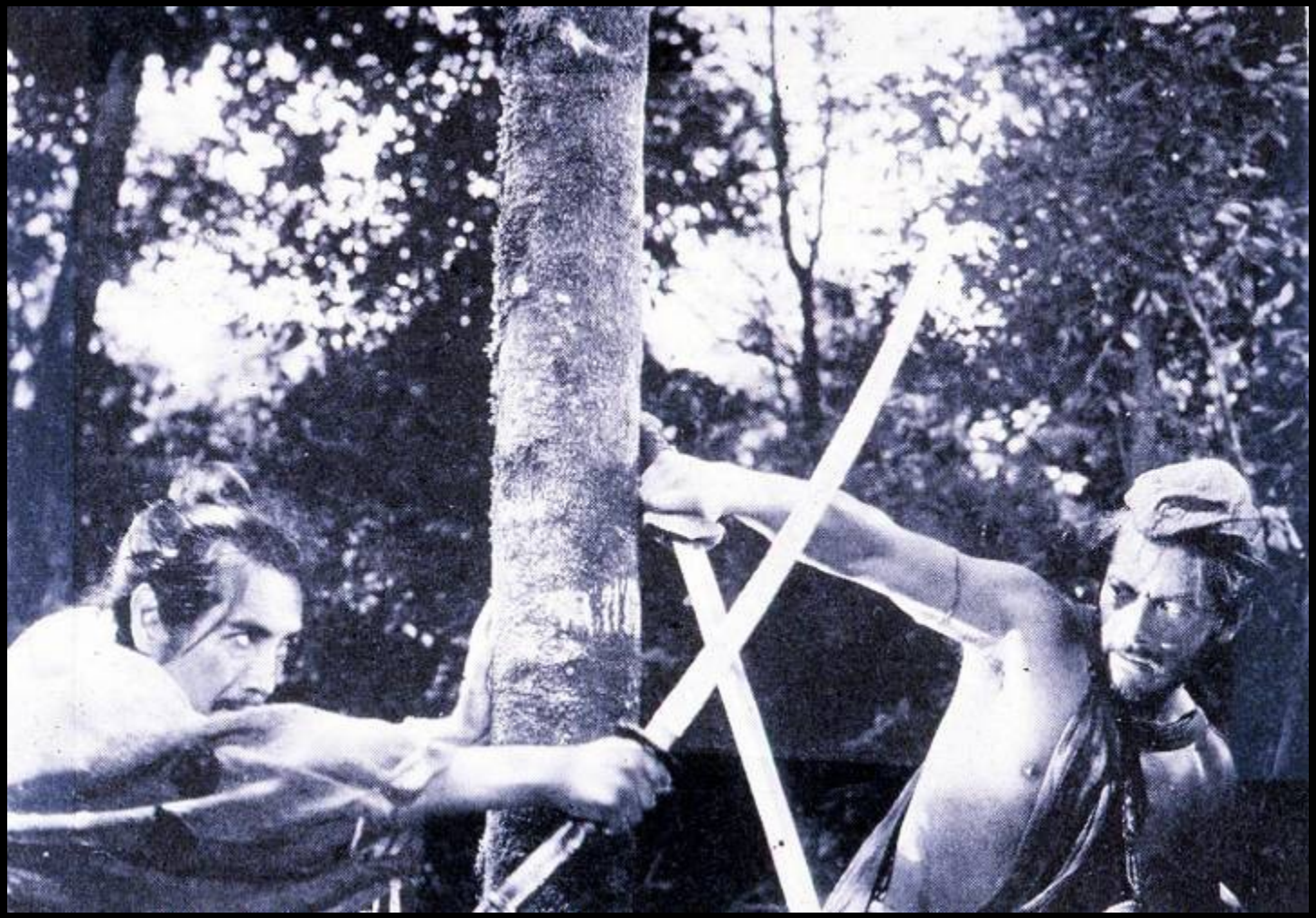


Anamorphic fresco
Rome, 1642

SENSORAMA / M.Heilig (~1960)



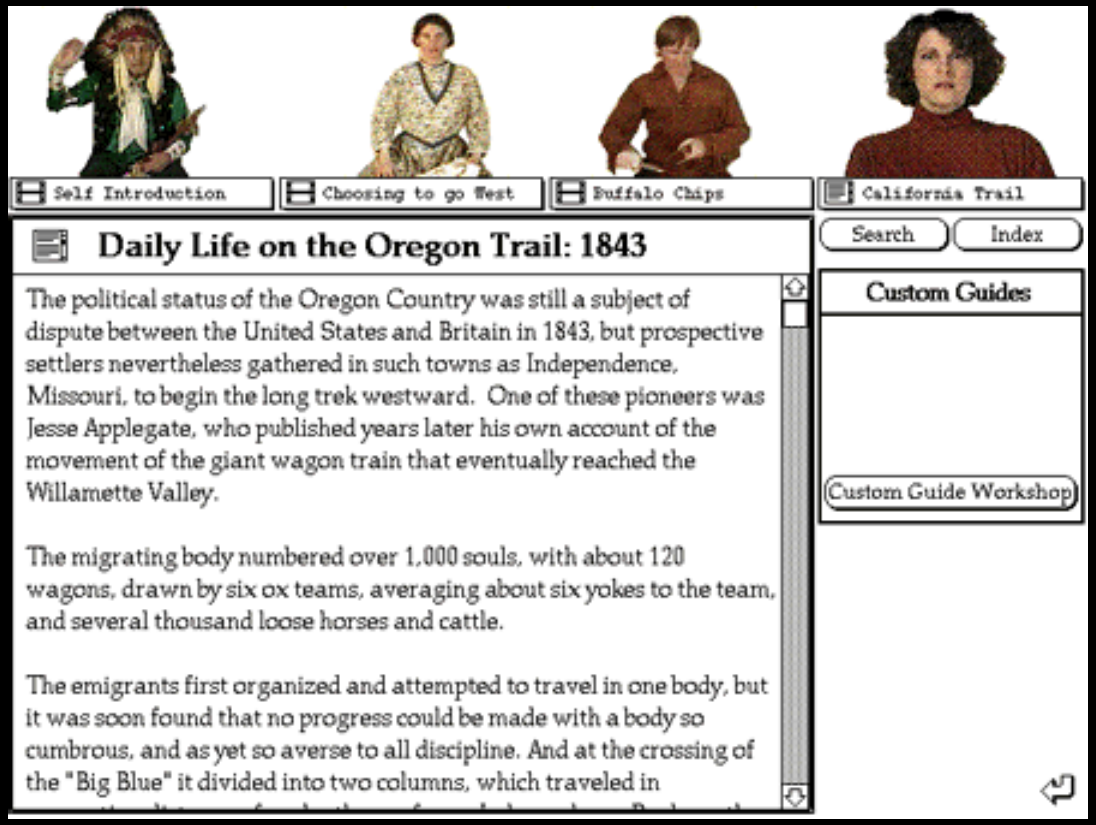
Collective Responsibility Vehicle



- “Rashomon”, Kurosawa (1951)

“Time Code”, Figgis (2000)

APPLE Multimedia Lab



- Guides Project (1988)

???

- “Interactive movies answer questions that don’t need to be asked. Regular movies aren’t broken”

Interactive Environments

- “ Whereas film is used to show a reality to an audience, cyberspace is used to give a virtual body, and a role, to everyone in the audience. Print and radio tell; stage and film show; cyberspace embodies.”

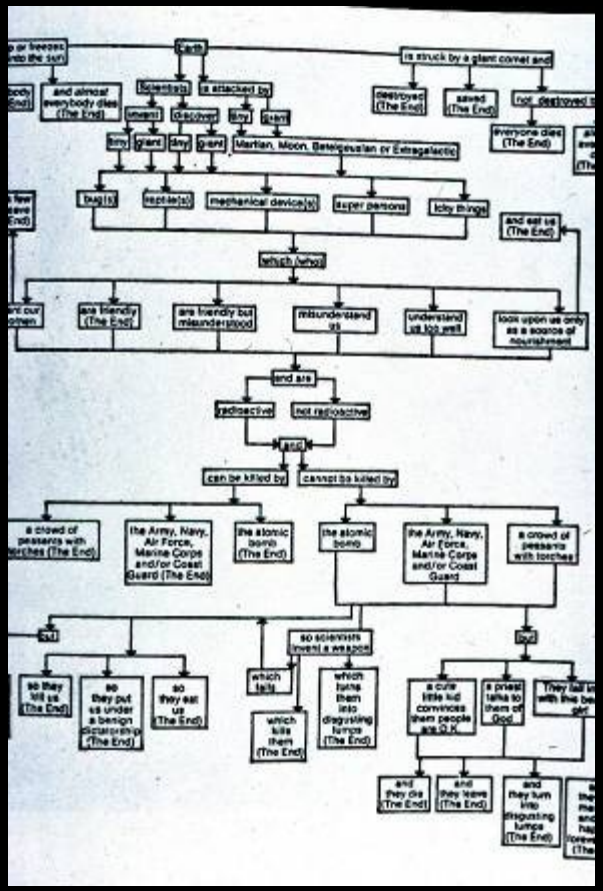
- The filmmaker says “Look, I’ll show you.” The spacemaker says, “Here, I’ll help you discover.”

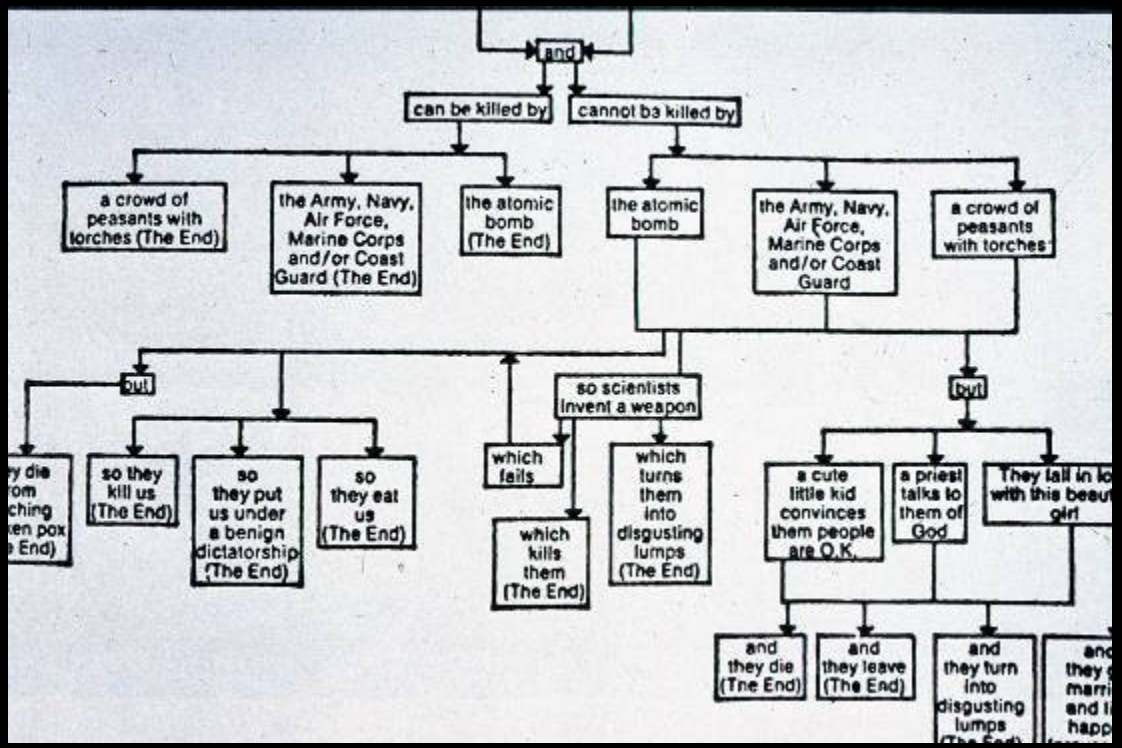
  – R. Walser

Interactive Environments

- Frequency – How often
- Significance – How much effect
- Range – How many choices

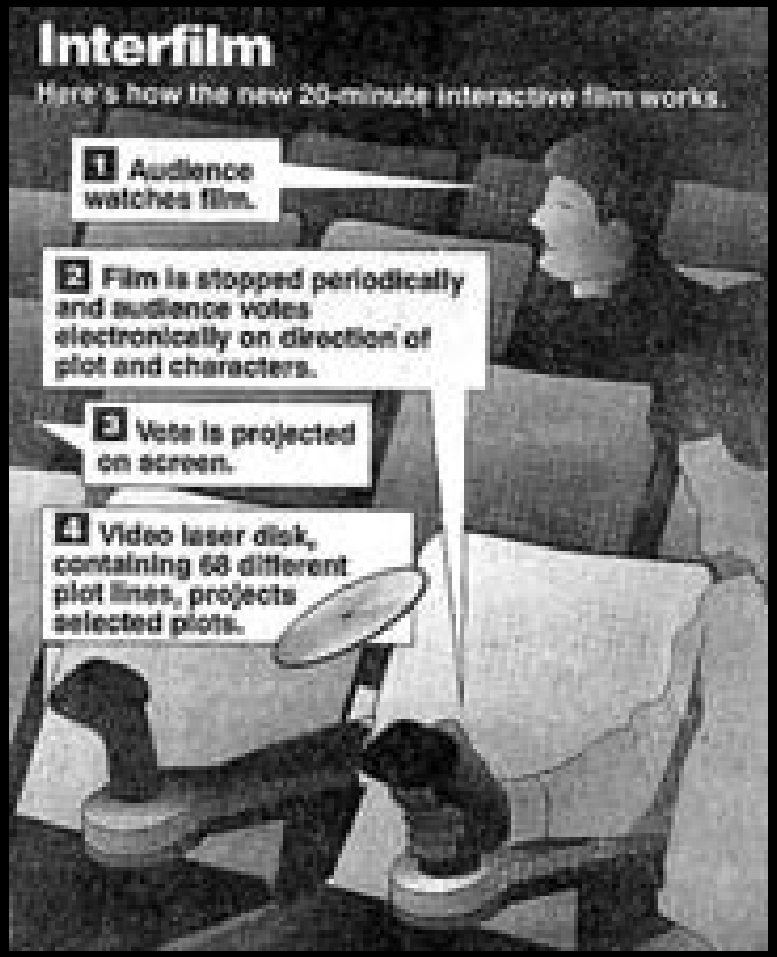
Interactive Narrative:
Branching





Interactive Film

- Interfilm, Inc. (1992 – 1995)
  - "Movie Games" based on majority rule
  - 42 theaters in US with special technology:
    - 4 laser disc players
    - Control computer with CD-ROM
    - Digital video switcher
    - "I'm your man" : 50 branch points


Interfilm
Here's how the new 20-minute interactive film works.
1 Audience watches film.
2 Film is stopped periodically and audience votes electronically on direction of plot and characters.
3 Vote is projected on screen.
4 Video laser disk, containing 68 different plot lines, projects selected plots.

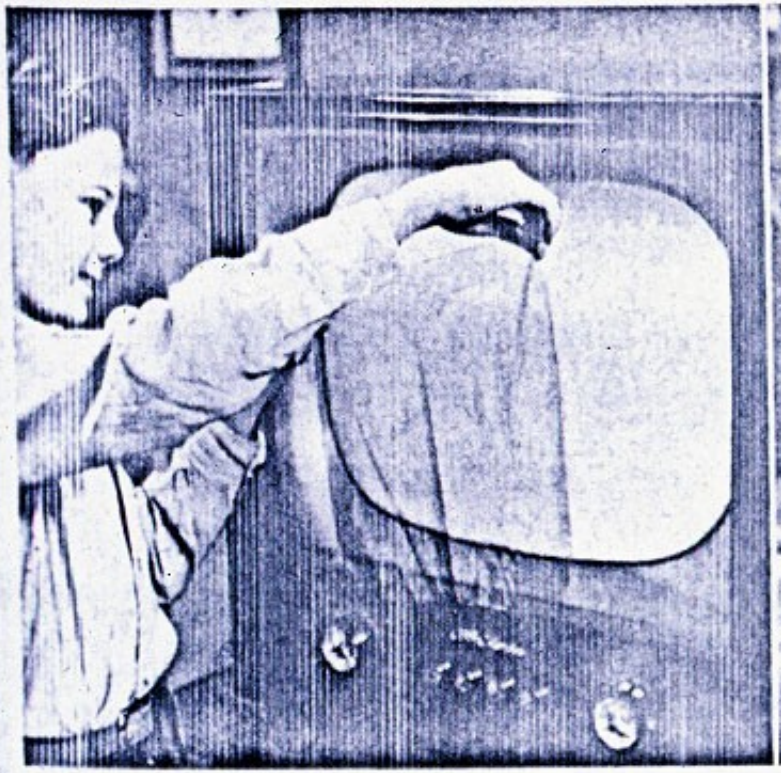
Interactive Film

- “Uncompressed”, by Margi Szperling (ACCD, 2000)
  - 6 “character tales”
  - Audience can switch between with interactive buttons
  - Allows the viewers to change perspective in mid-storyline
  - “These stories all interrelate and offer views of each other that help to illuminate the piece as a whole. By viewing all of the storylines the viewers begins to get a sense of the subjectivity of the environment created within the storyline.”

The choices in the interactive film Uncompressed are designed to enhance rather than overwhelm the narrative, letting the viewer decide whose story to follow and for how long.

Interactive TV

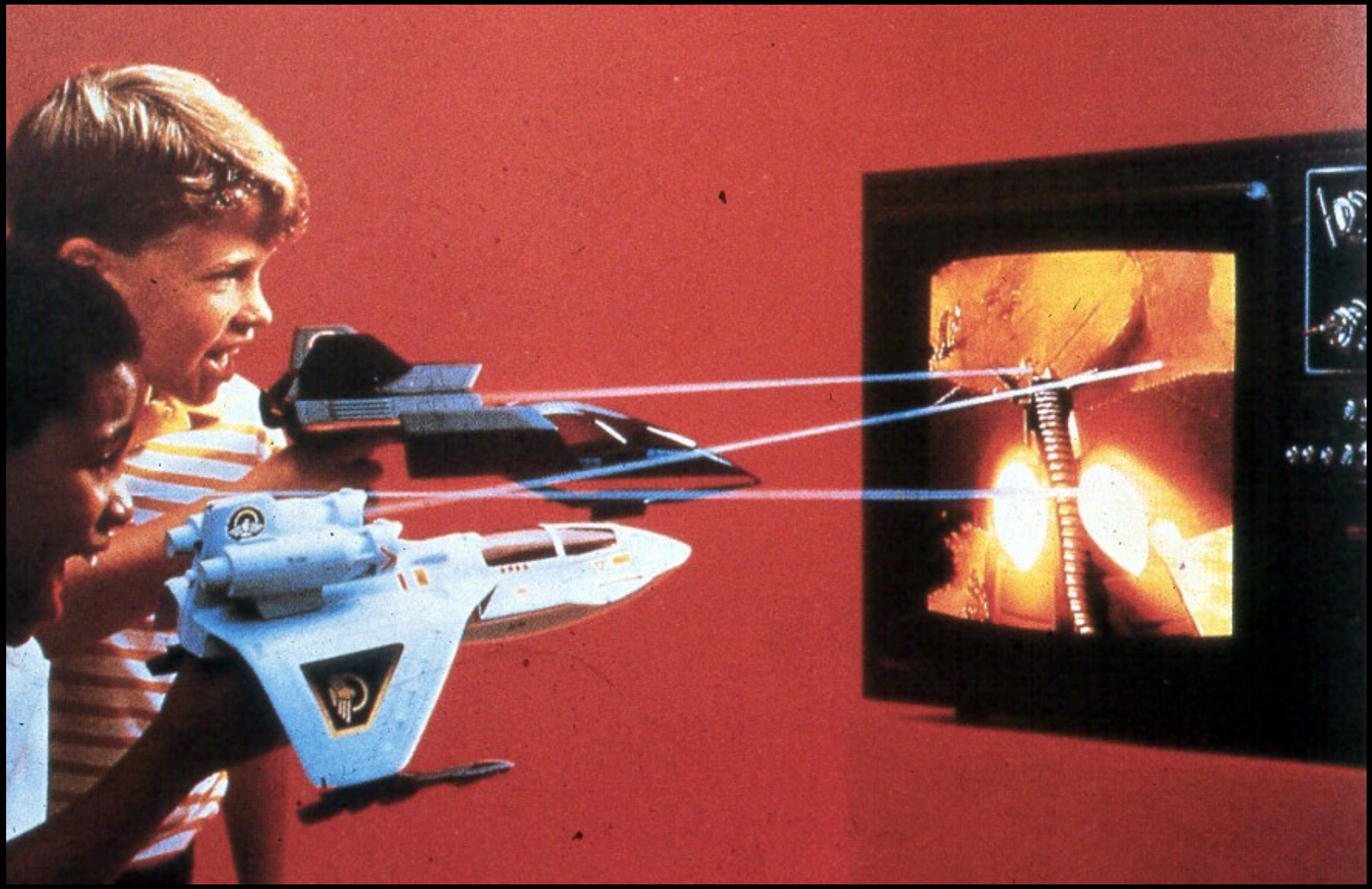
- Winky Dink, 1954
- Captain Power, 1982
- Paramount Media Kitchen (ITV prototypes)
  - POV Ticket Service, 1994
  - Voice of the People, 1994
- Redbeard’s Pirate Quest, 1999



Not on the Wall, Junior—Do Your Drawing on the TV Set!

A NEW TV program for youngsters puts them right in the act. Winky Dink, a cartoon character, encourages them to draw on the TV screen! A kit sold to the budding artists contains a transparent film to fit over the glass (above left), a box of crayons and a wiping cloth. As CBS's Jack Barry draws simple pictures on a transparent easel in the studio, the youngsters trace his lines (above right) at home.

Fig. 10



ATR

- "Romeo and Juliet in Hades" (1998-99)

Research on Art and Technology

Artists and engineers collaborate in research on new communication systems which can convey subtlenuances of interpersonal communication (Kansei information).

Interactive Theater

We are researching next generation movies in which the audience can enjoy the story as leading actors, interacting with characters by voice and gestures. It is expected that, by being at the center of a story, it will be possible to enjoy a sense of reality and immersion that is not possible with conventional novels and movies.

"Role Playing Movie" - Romeo and Juliet in Hades

Interactive Video

- Interactive Cinema Group, MIT Media Lab
  - Elastic Movies/Elastic Catalog
  - Wiesner: Random Walk
  - Agent Stories

Interactive Video

- Story Networks Group, Media Lab Europe
  (http://storynetworks.mle.ie/)
  - The Story Networks group prototypes new media story forms for emerging network technologies. These forms are designed to be customisable, personalisable and context-aware.
  - They allow us to contemplate the world from different perspectives; they automatically seek out willing receivers; using peer-to-peer architectures, they enable dynamic construction and trading of story bits
    allowing for multiple participant authors; they are highly distributed in time and space in both creation and reception; they interconnect and invite browsable exploration by crowds.

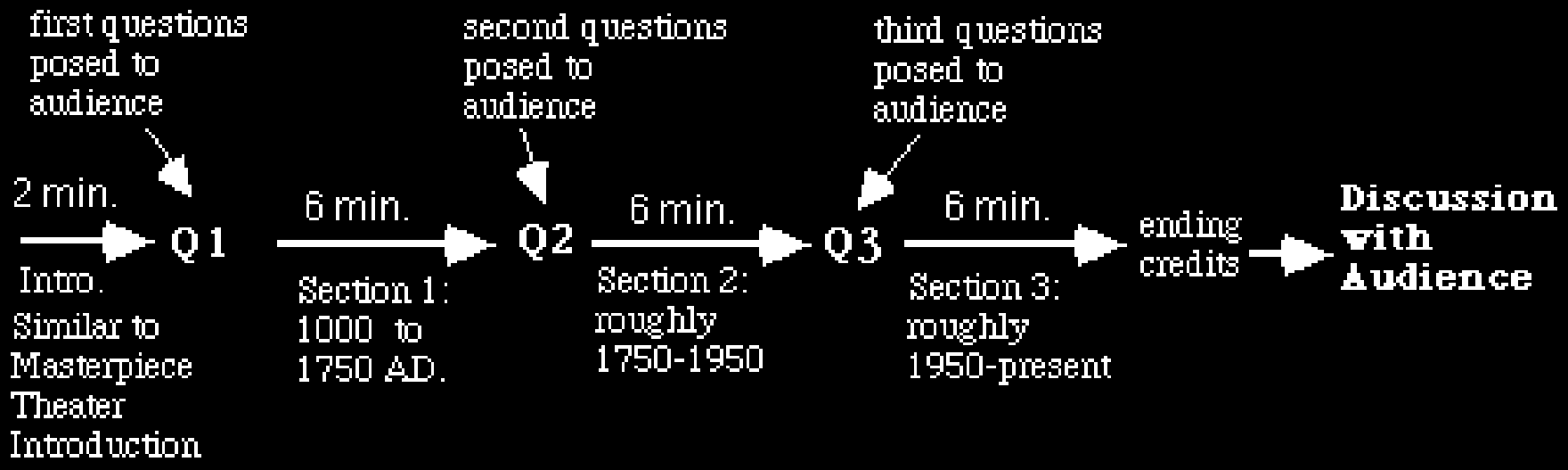
Interactive Video

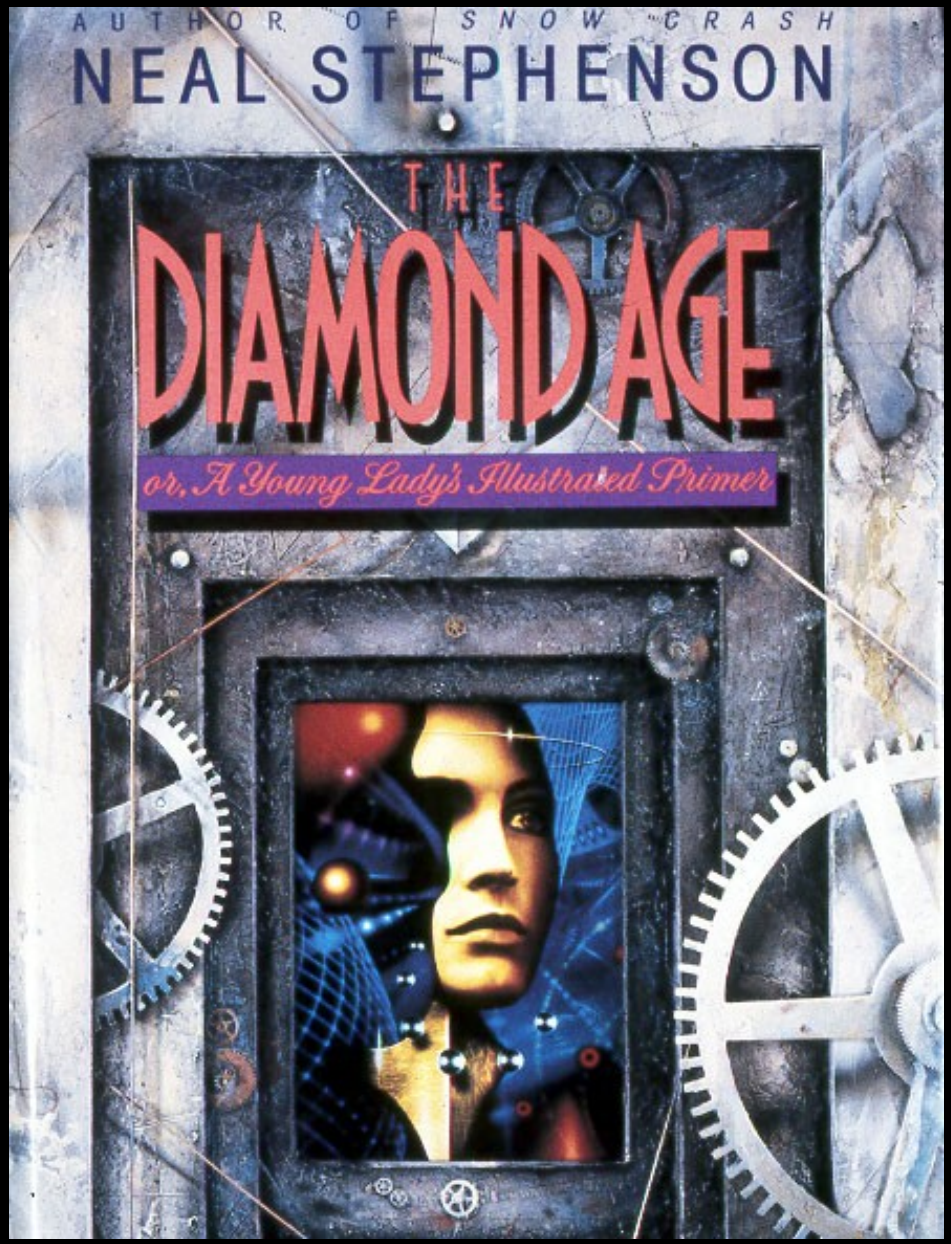
- “Office Voodoo”, M.Lew (2002)
  - an interactive sit-com where viewers can manipulate the emotions of the protagonists using a physical, graspable interface: voodoo dolls
  - Demo video

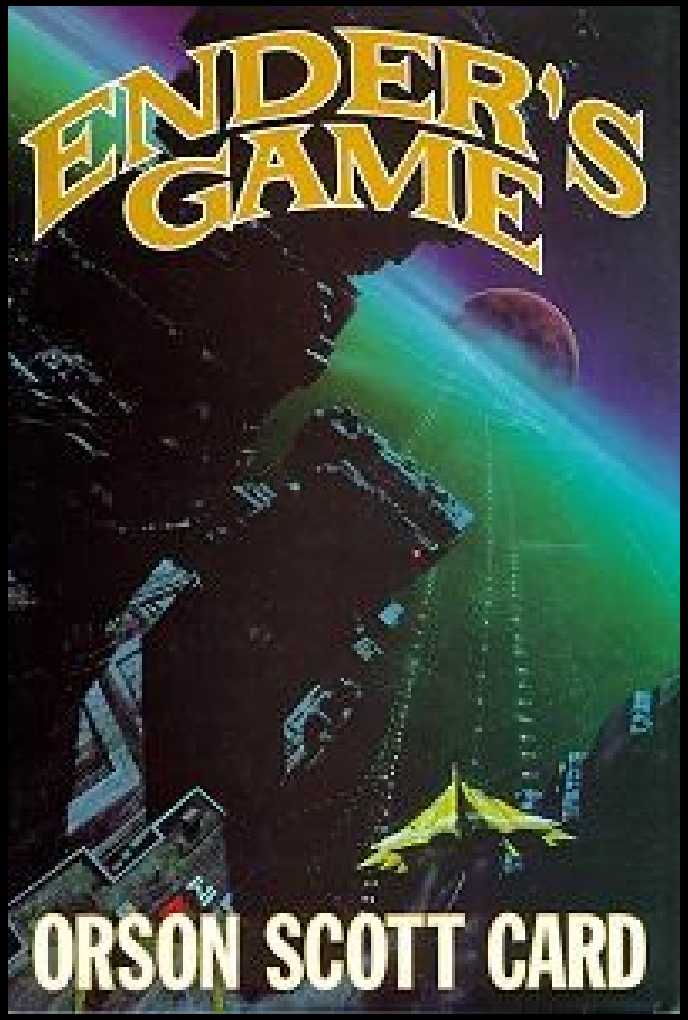
Interactive Video

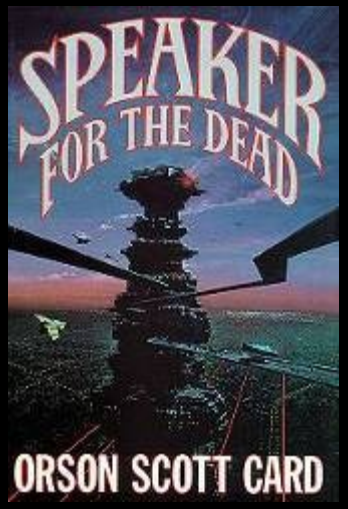
Interactive Video

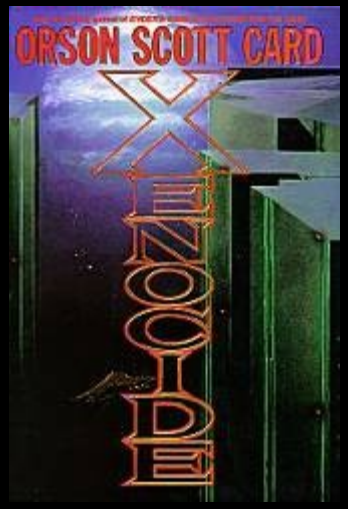
- "Terminal Time"
  - http://www.terminaltime.c

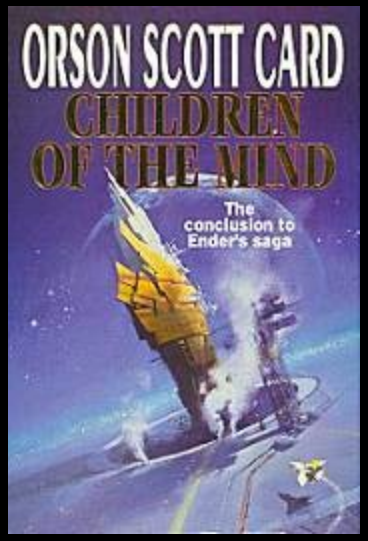



AUTHOR OF SNOW CRASH
NEAL STEPHENSON
THE
DIAMOND AGE
or, A Young Lady's Illustrated Primer

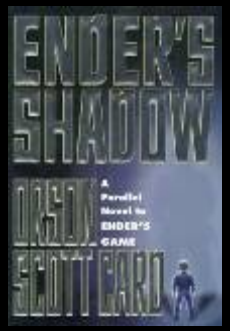


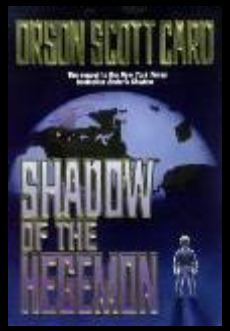






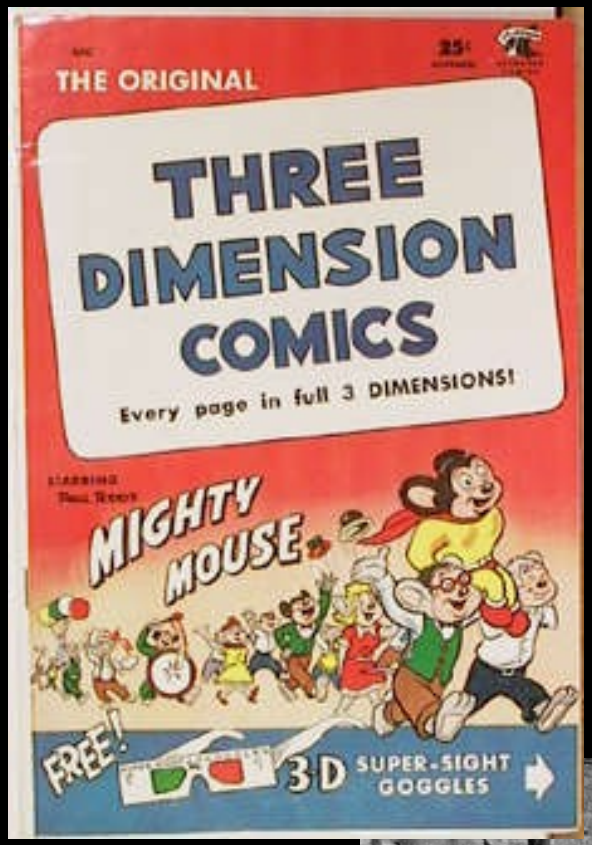
"Ender's Saga"
By Orson Scott Card



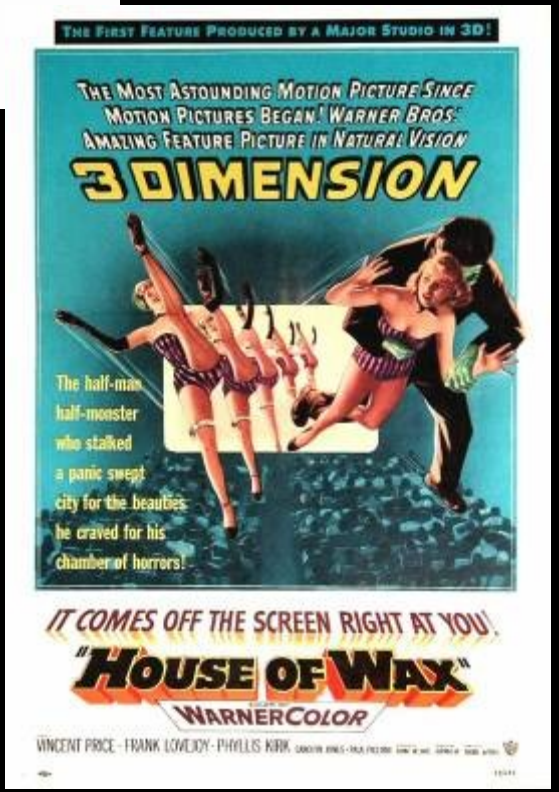


New Forms of Interactive Entertainment

- Mobile Entertainment
- Location Specific
- Pervasive games (eg. Majestic, the Beast)
- Interactive characters (aibo)
- Others?


THE ORIGINAL
THREE DIMENSION COMICS
Every page in full 3 DIMENSIONS!
MIGHTY MOUSE
FREE!
3D SUPER-SIGHT GOGGLES


CINERAMA


THE FIRST FEATURE PRODUCED BY A MAJOR STUDIO IN 3D!
THE MOST ASTOUNDING MOTION PICTURE SINCE MOTION PICTURES BEGAN! WARNER BROS.' AMAZING FEATURE PICTURE IN NATURAL VISION
3 DIMENSION
The half-man half-monster who stalked a panic swept city for the beauties he craved for his chamber of horrors!
IT COMES OFF THE SCREEN RIGHT AT YOU!
"HOUSE OF WAX"
WARNERCOLOR
VINCENT PRICE · FRANK LOVEJOY · PHYLLIS KIRK

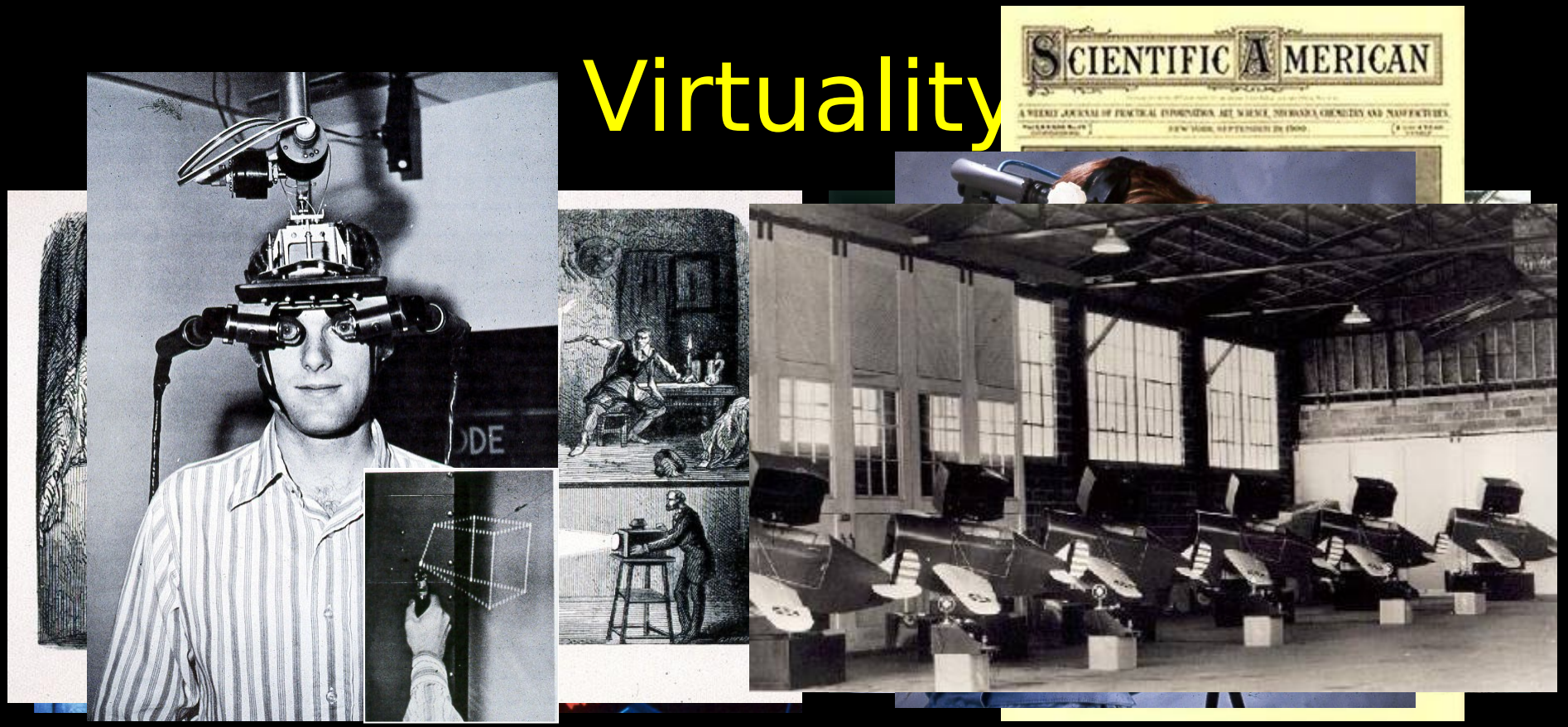

RKO PANTAGES
WORLD PREMIERE FIRST TIME ANYWHERE
3D ON NEW WIDE SCREEN
IT CAME FROM OUTER SPACE
EXTRA! NAT KING COLE MUSICAL SHORT IN 3D
First Time Anywhere! 3D

Technologies of Presence

Technologies of Presence

- 1. Virtual Environments
- 2. Remote Presence
- 3. Mixed Reality / Environmental Media
  - augmented reality
  - wearable computing
  - mobile multimedia

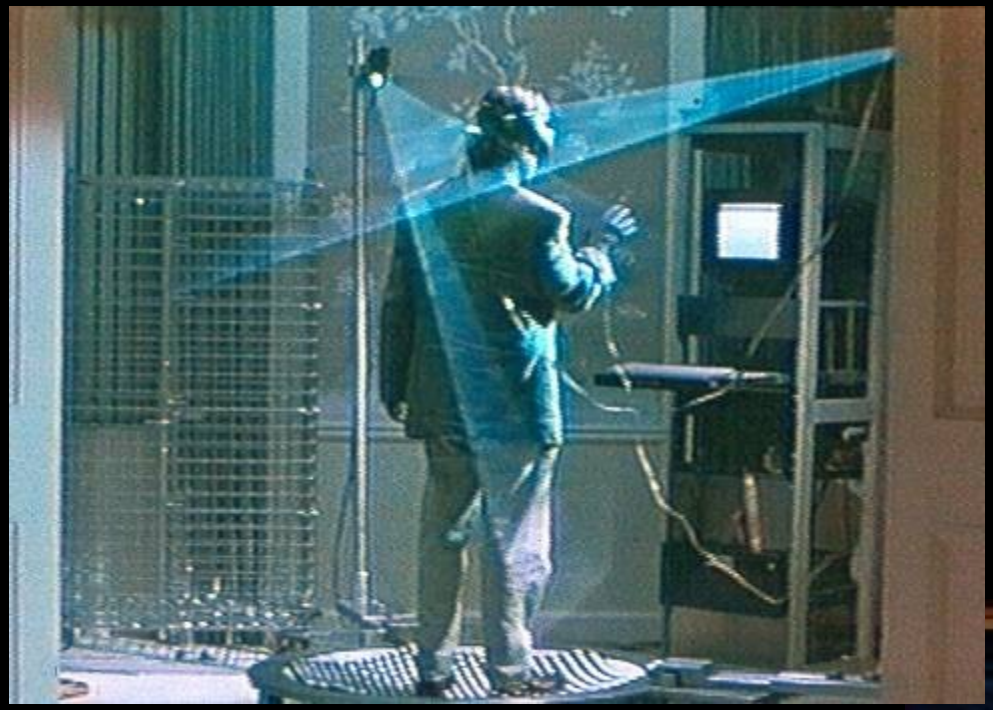
Virtuality



Milgram, et al

Key Components of Immersive Virtual Environments

- Immersion and the sense of presence
- First-person point of view
- Individual viewpoint control
- Multisensory interface




JEFF FAHEY PIERCE BROSNAN
THE LAWNMOWER MAN
"One of the hottest science-fiction movies to blow your mind since 'TOTAL RECALL.'"


©1995 JOHNNY MNEMONIC PRODUCTIONS INC.

IM seminar Fall 200
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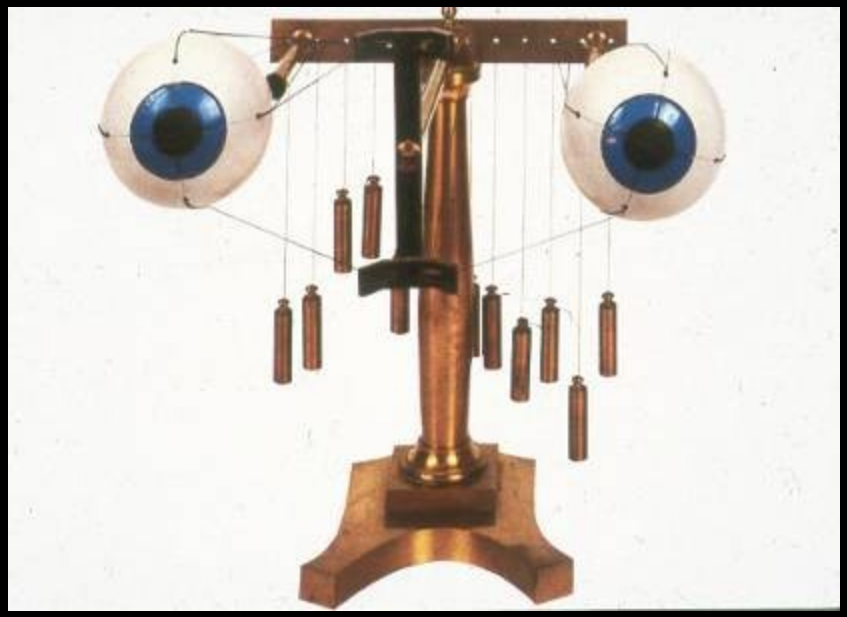
Terminology spectrum:

- Virtual Environments, Artificial Reality, Virtual Reality, Cyberspace, Synthetic Environments...

- Remote Presence, Tele-existence, Tele-symbiosis

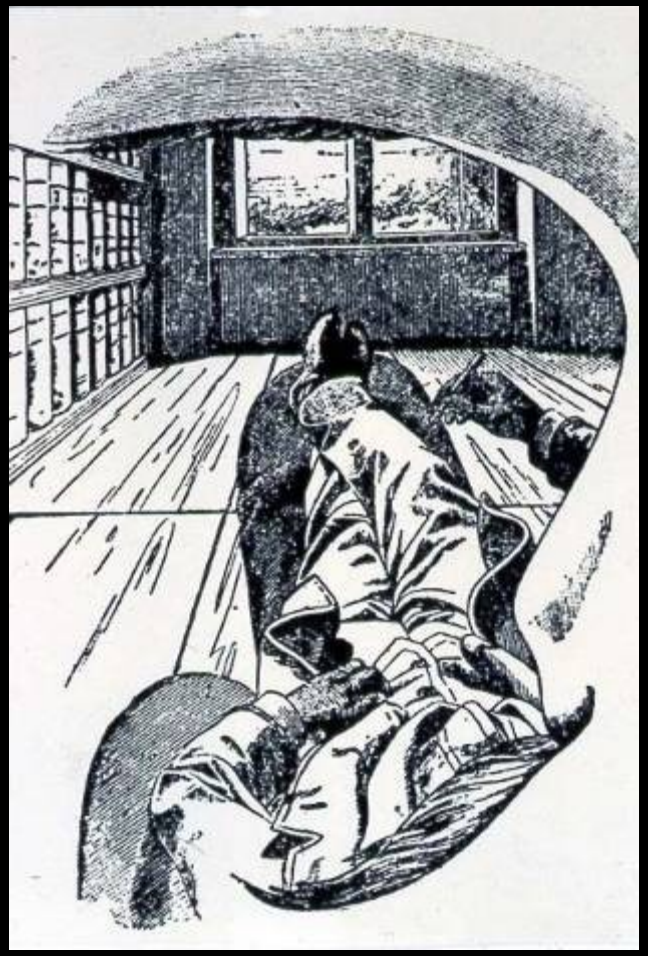
VR Design Goals

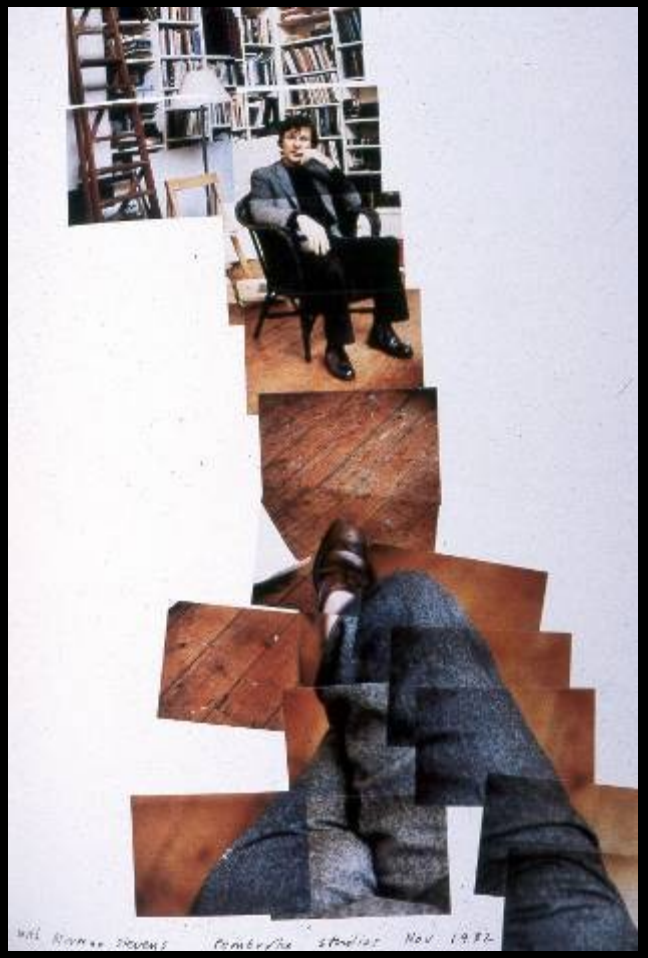
- Presence – A subjective, multi-dimensional sensation of being here or there rather than elsewhere.
- *Tele*presence - A medium through which people can physically and emotionally experience remote or virtual places



Human Factors:
Basic research in human perception/cognition

Media Technology:
Matching display and interaction technology to human "specifications"





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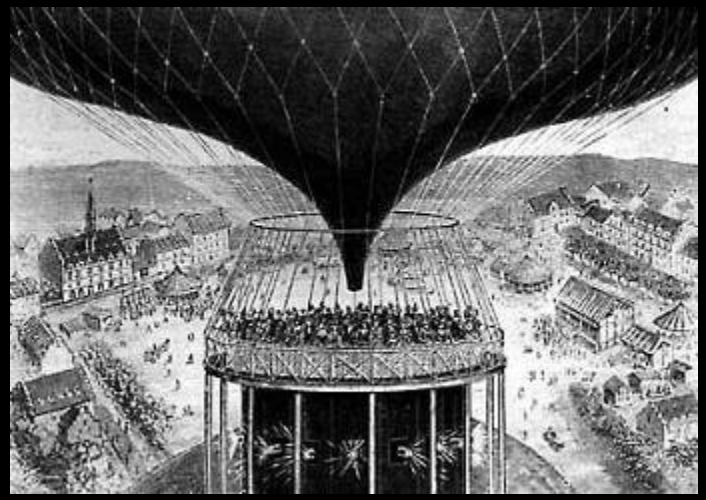
Historic Virtual Environments

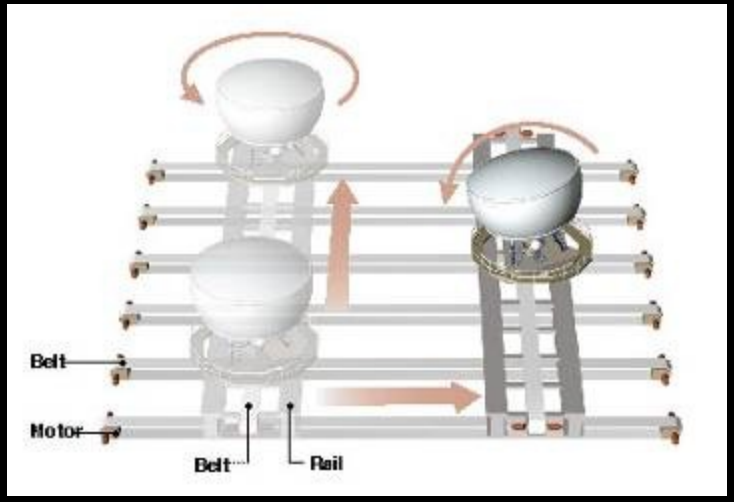


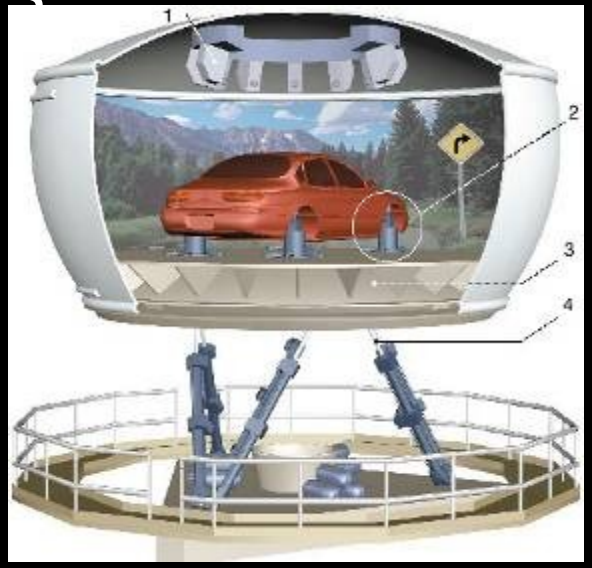
- Panorama
  - London Colosseum
  - 19th century

- Cineorama, 1900

Historic Virtual Environments

- Early Simulation Environments:
  - Aircraft, ship, automotive, locomotive
  - Entertainment simulators





Interactive Stereoscopic Displays

- Architecture Machine Group, MIT
  - Aspen Movie Map, 1978-81
  - Stereoscopic Workstation – 1980
  - Viewpoint Dependent Imaging – 1981

MIT Architecture Machine Group:

- Aspen Movie Map, MIT (1979-82)
  - Interactive, multiple viewpoint, multimedia simulation of a specific place
  - First use of “Virtual Environments” term

MIT Architecture Machine Group:

- “Stereoscopic Drawing System” (1980)

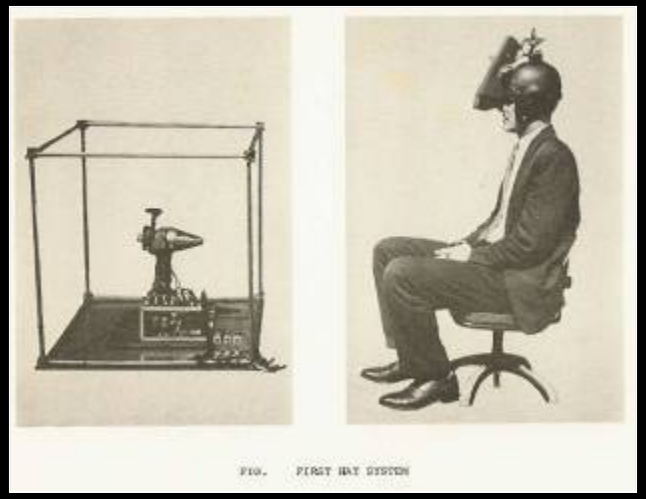
- “Stereoscopic Workstation”, MIT (1980)

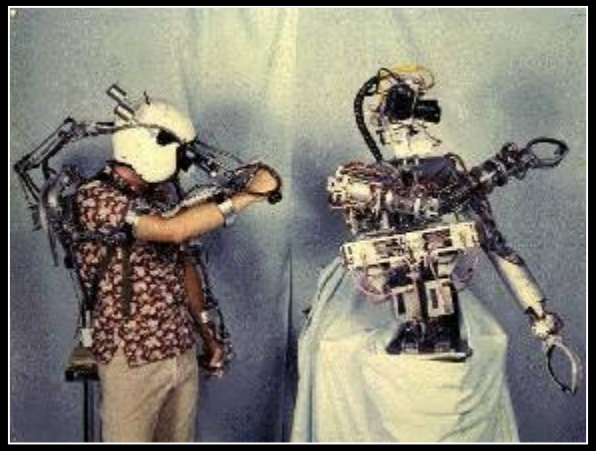
MIT Architecture Machine Group:

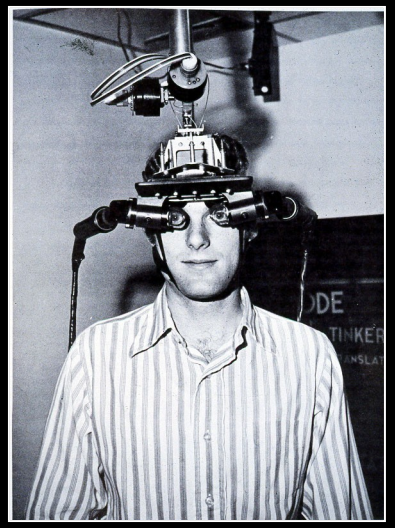
Viewpoint Dependent Imaging
(MIT, 1981)

Early Head-Mounted Displays

- Philco – 1950s
- Sutherland – 1968
- Telefactor Corp. – 1970s
- NOSC (US Navy) – 1970s





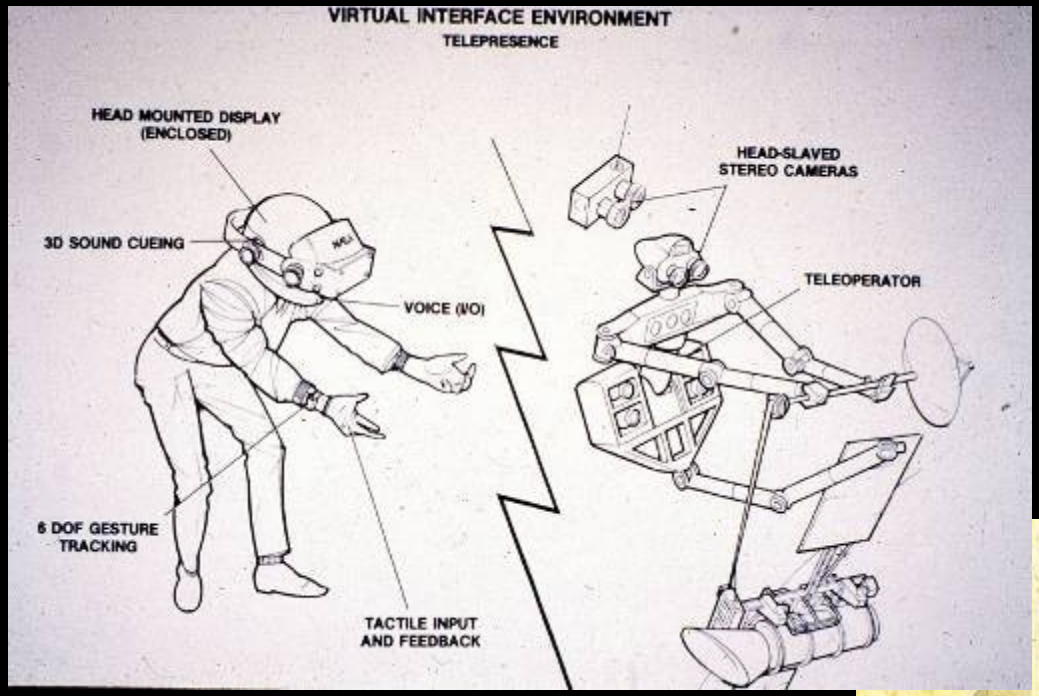


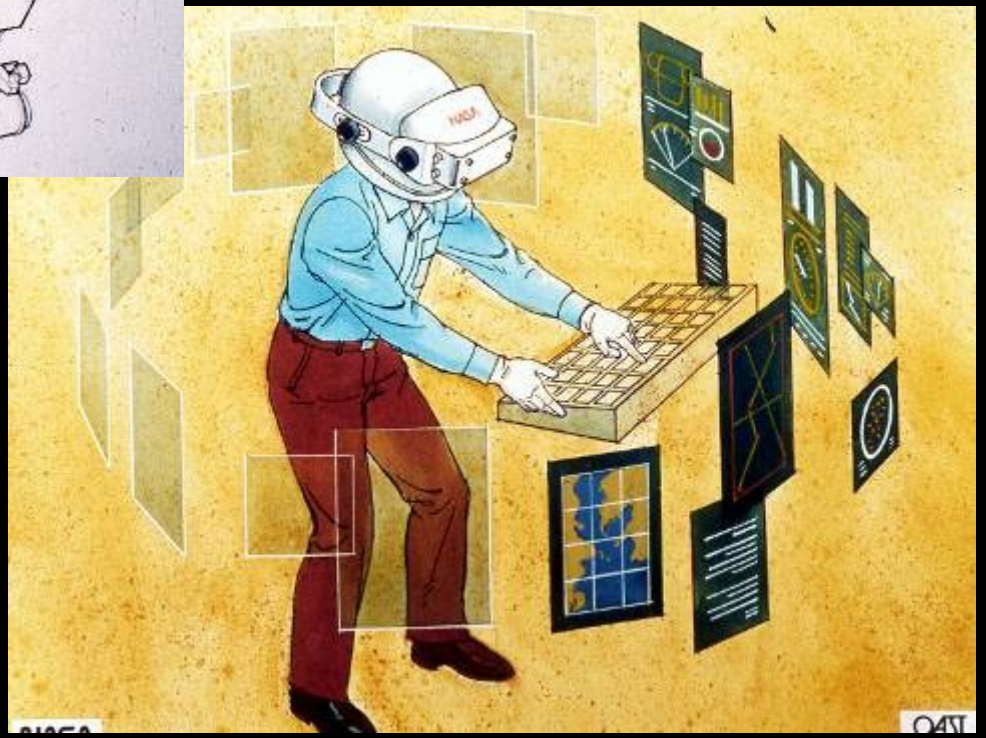
Recent Head-Mounted Displays

- MIT Architecture Machine Group - 1981
- ARMY/Air Force – 1980s
- MITI/MEL – 1985
- NASA Ames Research Center – 1985

NASA Ames Research Center

- Virtual Environment Workstation VIEWlab (1985-1990)


VIRTUAL INTERFACE ENVIRONMENT
TELEPRESENCE
HEAD MOUNTED DISPLAY (ENCLOSED)
3D SOUND CUEING
VOICE (I/O)
6 DOF GESTURE TRACKING
TACTILE INPUT AND FEEDBACK
HEAD-SLAVED STEREO CAMERAS
TELEOPERATOR




NASA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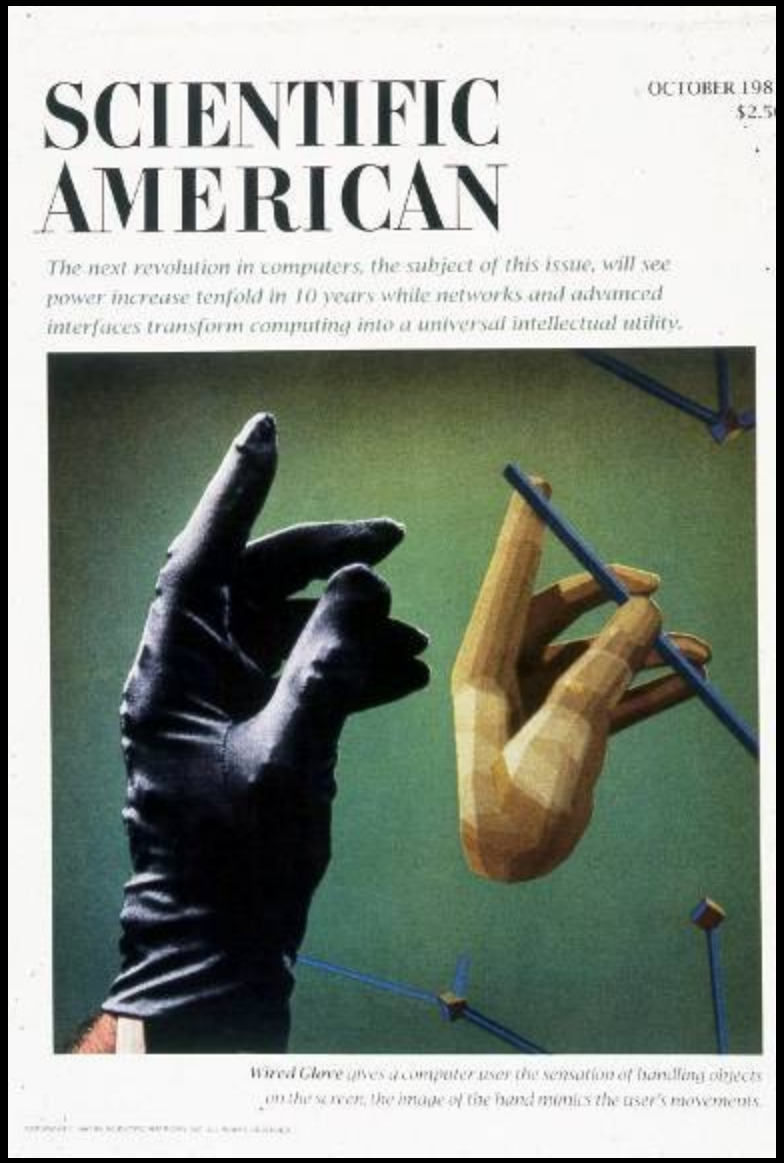
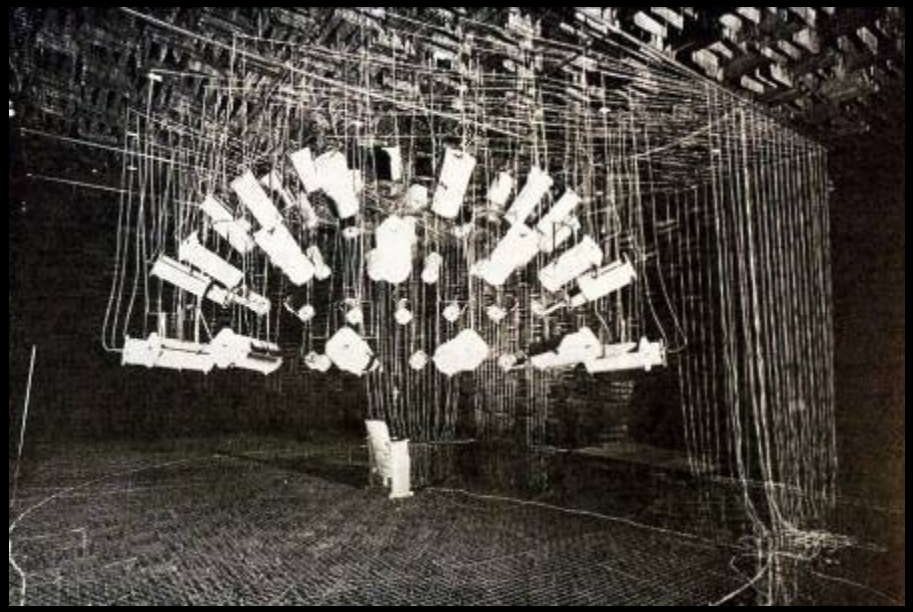
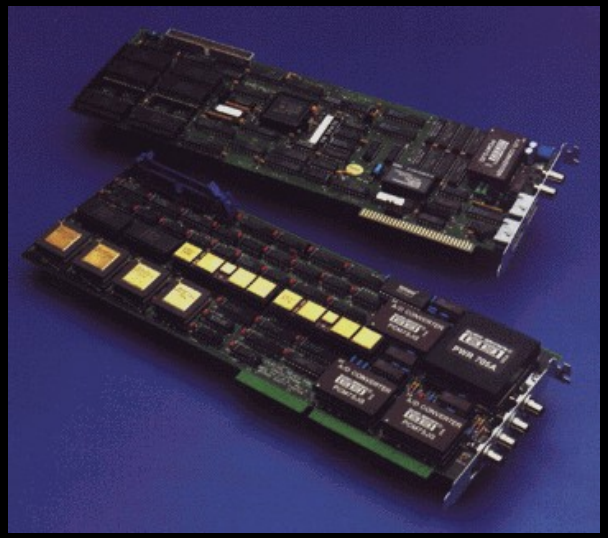
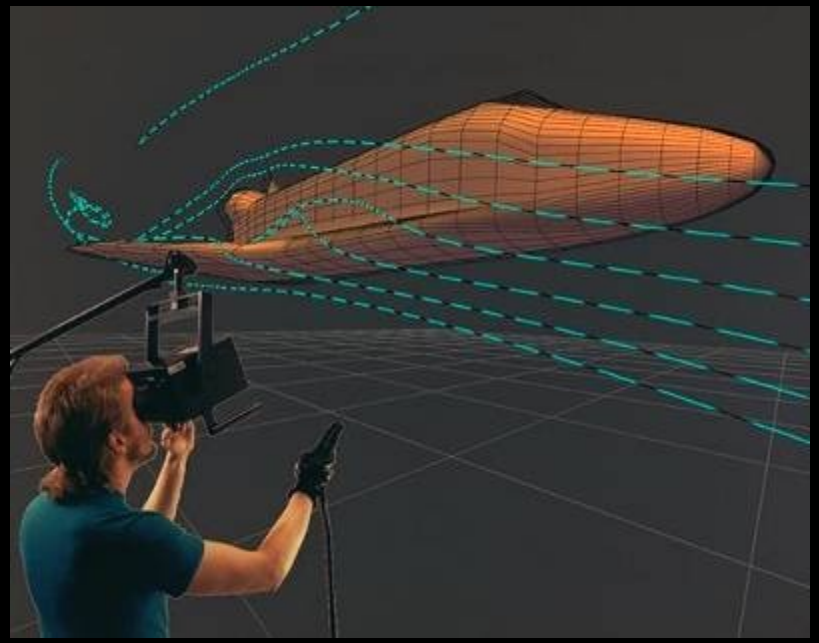

SCIENTIFIC
AMERICAN
OCTOBER 198
$2.5
The next revolution in computers, the subject of this issue, will see power increase tenfold in 10 years while networks and advanced interfaces transform computing into a universal intellectual utility.
Wired Glove gives a computer user the sensation of handling objects on the screen; the image of the hand mimics the user's movements.




NASA

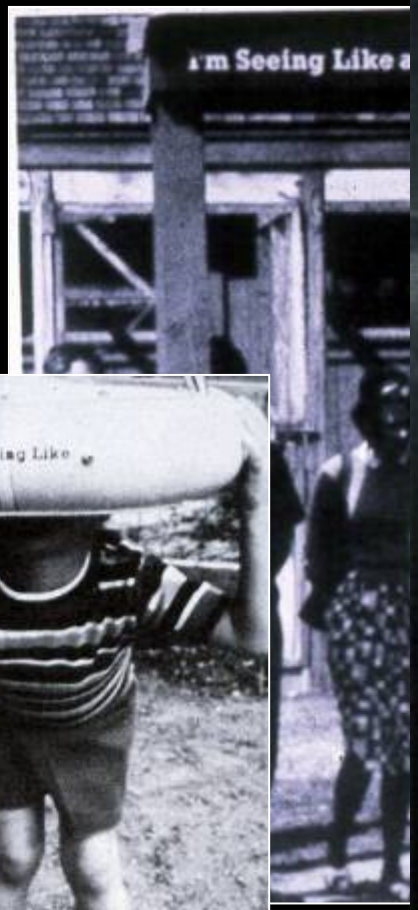




Key Components of Telepresence Experiences

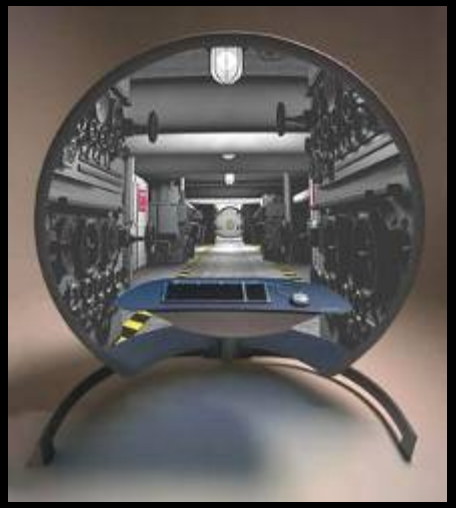
- Immersion and the sense of presence
- First-person point of view
- Individual viewpoint control
- Multisensory interface


I'm Seeing Like
a Goat

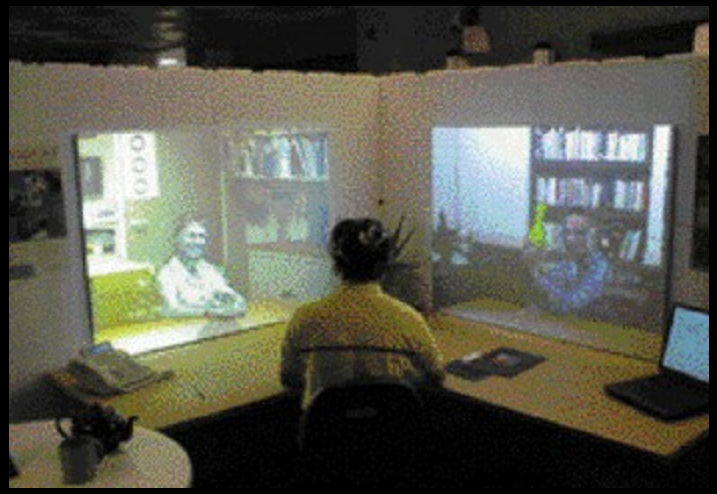

m Seeing Like


SEE
what you've been
MISSING
VIRTUAL
V8
RESEARCH

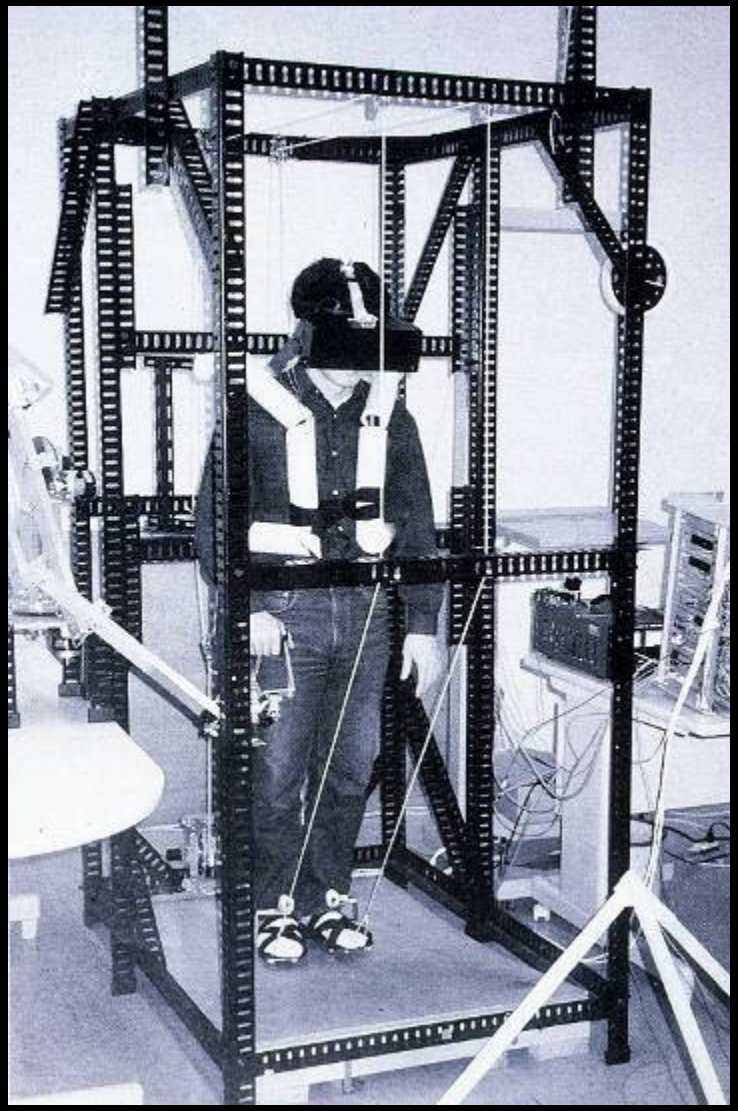

Onyx Application Brief Number 4, Volume One

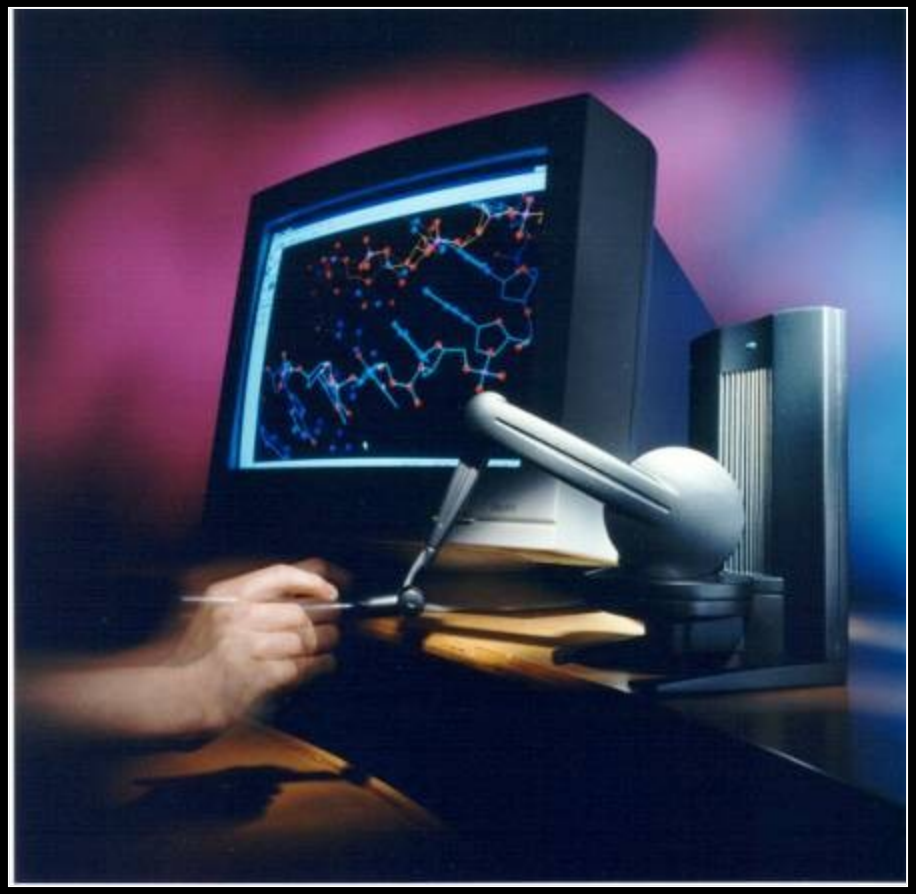



VISIONSTATION




MuSE
Panoram
Technologies
HEWLETT
PACKARD






I-FORCE

THE BRAINS OF SMELL-O-VISION—Michael Todd, Jr. (left) sits beside master control and scent energizer of the Smell-O-Vision system with its inventor Hans Lube. Latter points to the multitude of vials each containing a different scent which is selectively projected through tubes to every seat in theatre on signal triggered from picture's sound track.

"Scent of Mystery" trumpeted the technology as a landmark of film history: "First They Moved (1895)! Then They Talked (1927)! Now They Smell!"(1960)

Food Simulator – Hiroo Iwata, University of Tsukuba (2003)

- Training
  The Food Simulator can be programmed to generate various forces other than those of real food. Elderly people can practice biting with reduced resistance to the teeth. On the other hand, increased resistance enables younger people to understand the biting difficulties experienced by elderly people.

- Entertainment
  The Food Simulator can change the properties of food during chewing. A cracker can be suddenly changed into a gel, for example, which generates a surprising and humorous experience. This kind of entertainment contributes to chewing capabilities in children.

- Food design
  Preferred resistance to the teeth can be analyzed using the Food Simulator. The findings can contribute to designing new foods.

Current Status

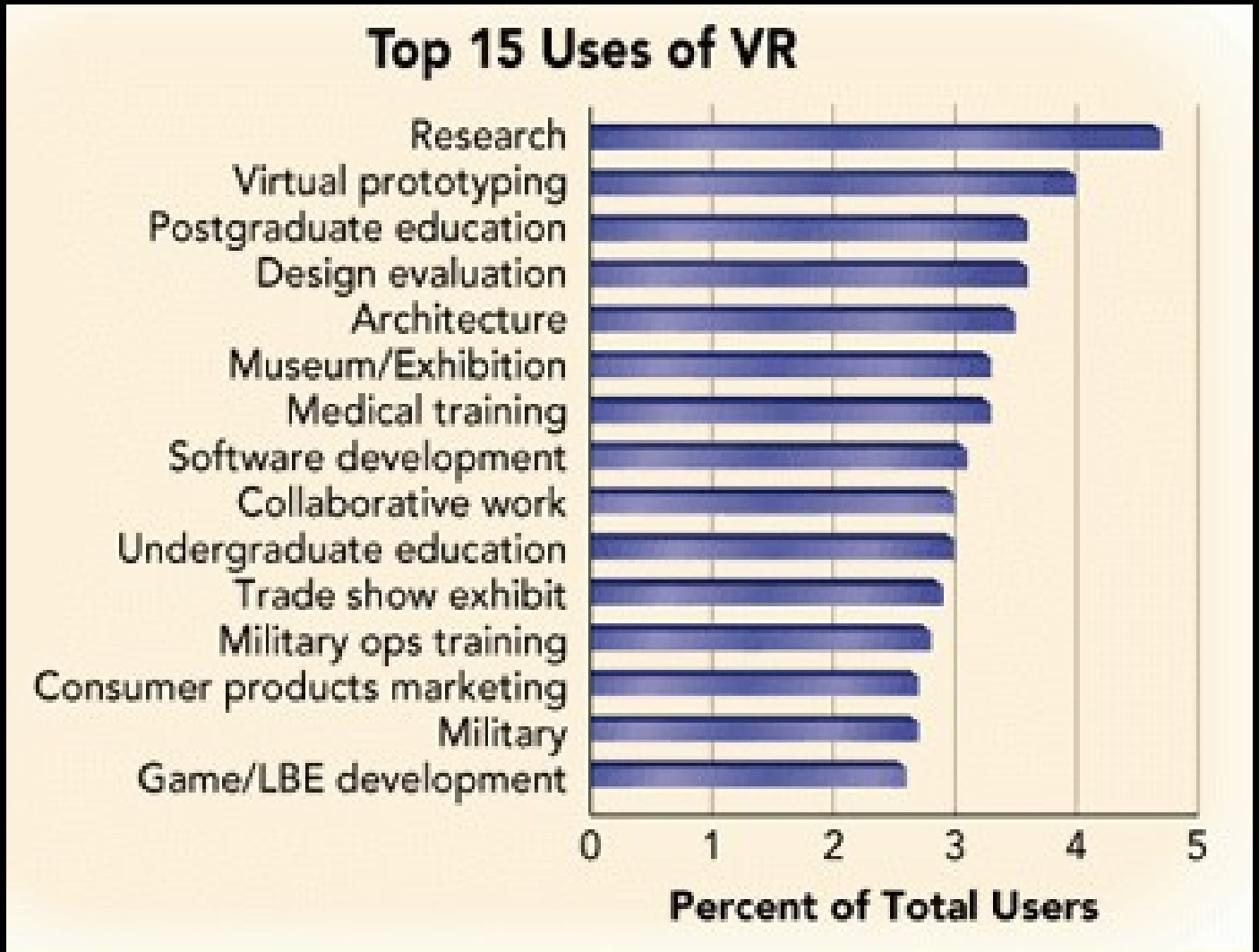
- Emphasis still on technology and engineering
- Technologies developed so far provide simple but adequate sense of presence
- Shifting from technology integration to “Experience Design”
- Rudimentary language of Telepresence beginning to emerge
- Focus on content is driving new performance criteria and design tools

Application Areas

- Entertainment
- Leisure/Sports
- Learning/Training
- Telecommunications
- Architecture, Engineering, and Design
- Scientific Visualization
- Information Management
- Medical Applications
- Art
- Advertising
- Remote Presence

Applications: Entertainment

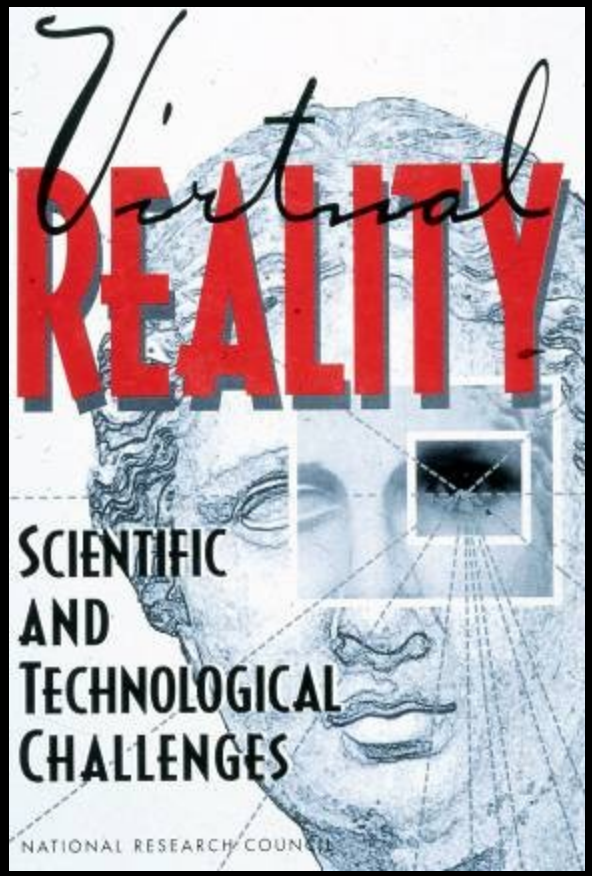
- DisneyQuest - “Aladdin’s Magic Carpet Ride”
- 1998



In the past year, research overtook prototyping as the most popular use of VizSim/VR, and the museum/exhibition category ranked among the top 15 applications for the first time.

Application Areas

- "Virtual Reality: Scientific and Technological Challenges", National Research Council (1995)
  - Cross disciplines
  - Can be applied to any learning task
  - Can increase range of experiences
  - Can provide micro worlds not available in real world
  - Can expand peer group for collaboration (telepresence)

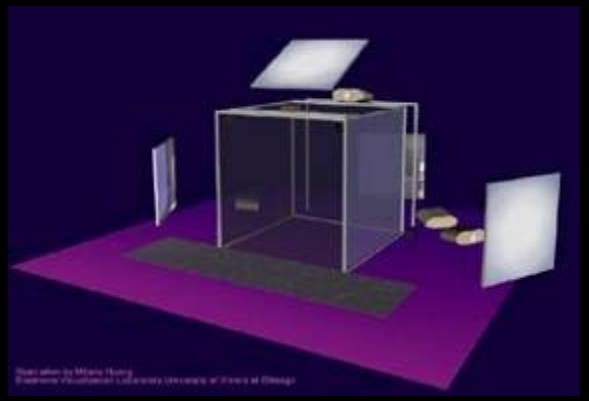


Application Areas

- “Virtual Reality: Scientific and Technological Challenges”, National Research Council (1995)
  - “…unless the infrastructure surrounding the education system is radically changed, the best opportunity for using SE technology to help educate children is likely to occur through the entertainment industry and the entertainment facilities that will be available in many homes…”
  - Issues:
    - Desirability – does it make sense?
    - Effectiveness/feasibility – does it help learning?
    - Practicality – is it cost effective?

Applications: Scientific Visualization

- CAVE Projects - Electronic Visualization Lab (EVL), University of Illinois at Chicago



Applications: Education

- “Zengo Sayu”, HITLab, Univ. of Washington (1995)
  - Immersive, interactive virtual environment for teaching Japanese

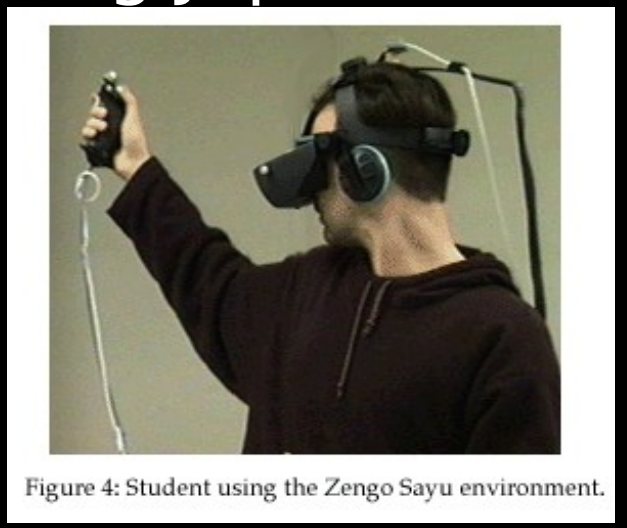


Figure 4: Student using the Zengo Sayu environment.

Current Examples

- “Zengo Sayu”, 1995
  - HitLab, Univ. of Washington
  - Immersive, interactive virtual environment for teaching Japanese:
    - Teaches colors, nouns, prepositions by touch exploration and object relationships
    - Verbs taught with speech and video
    - Speech and gesture questions and games

Figure 1: The student is represented as a virtual hand in the environment.

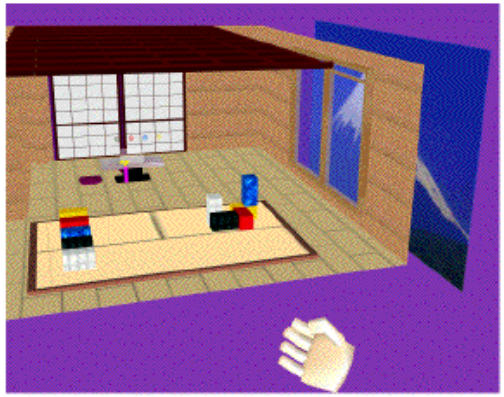


Figure 2: View of Zengo Sayu environment from above.

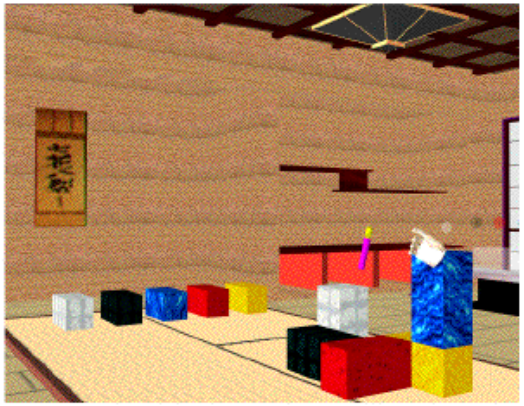


Figure 3: Inside the environment, shown with a model configuration and boxes for students to recreate the model (advanced stage of the environment).

Figure 4: Student using the Zengo Sayu environment.

Figure 5: Student using the Zengo Sayu environment. Note Polhemus tracking source hanging above student.

"Zengo Sayu", 1995

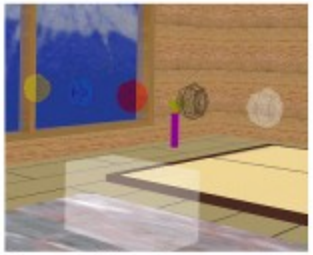


Figure 6: Color orbs appear above the translucent box when the student enters the environment.

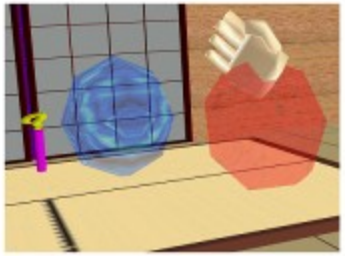


Figure 7: Picking the orb, the student hears the word for red: "Aka."

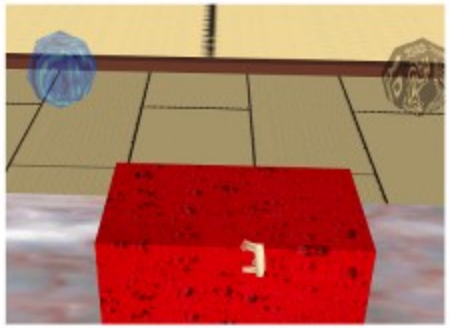


Figure 9: The student places the red orb into the translucent box to create a red box: "Akai hako."

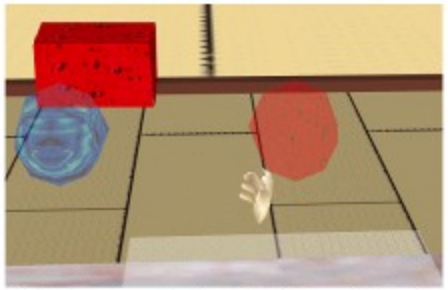
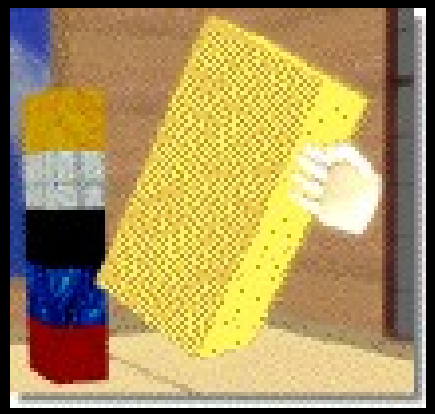
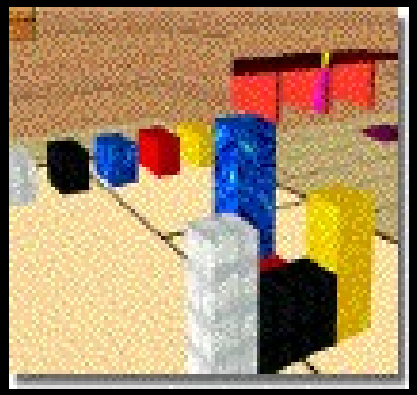


Figure 10: The red box flies from the table onto the stage area.

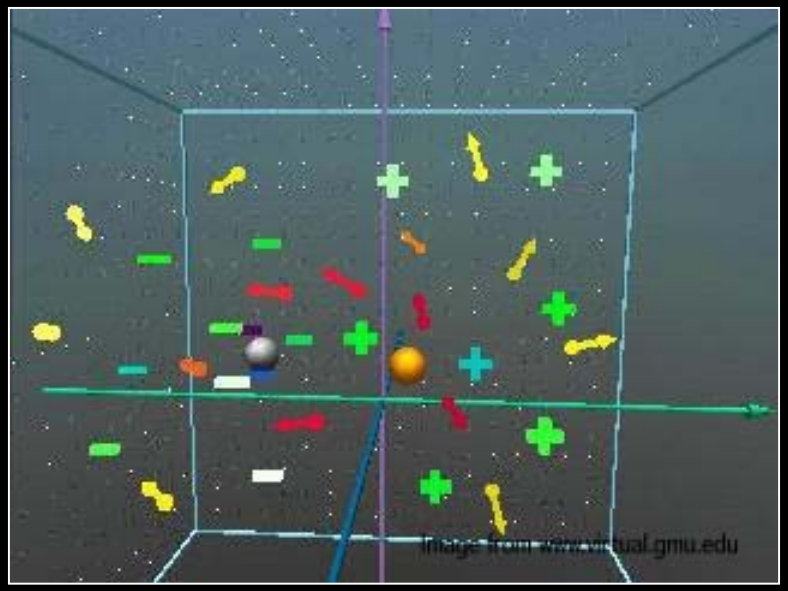


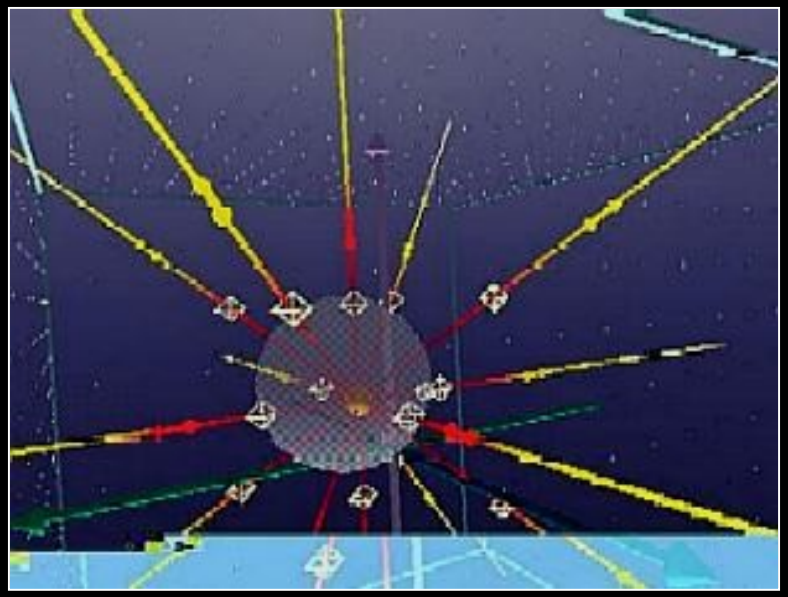


“Zengo Sayu”, 1995

Applications: Education

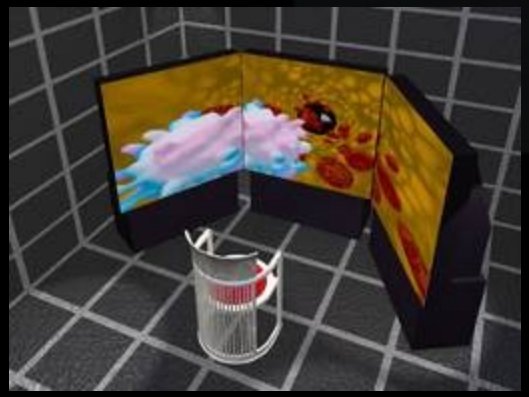
- “ScienceSpace”, 1995
  - Team: NASA Johnson Space Center, George Mason University, and Univ. of Houston

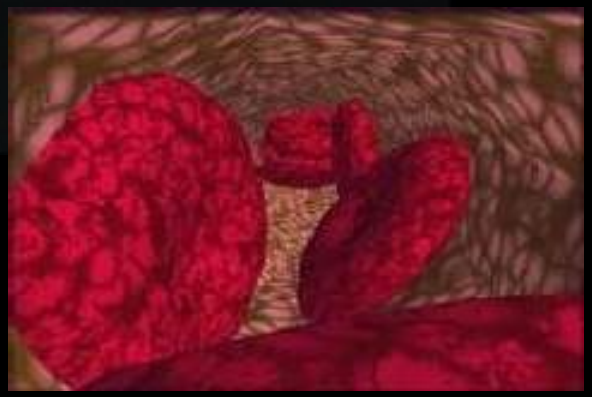


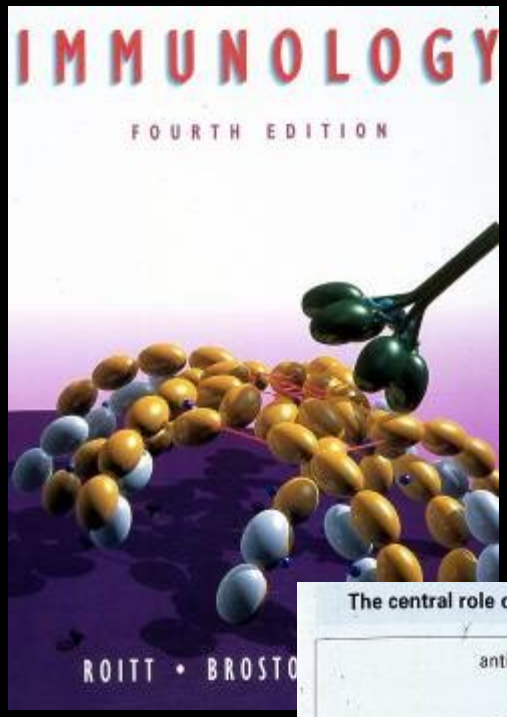


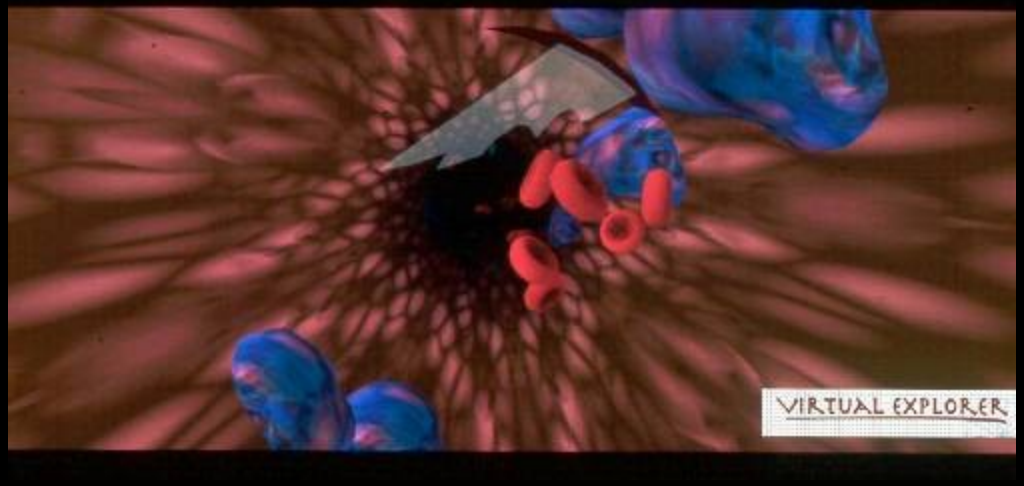
Applications: Education

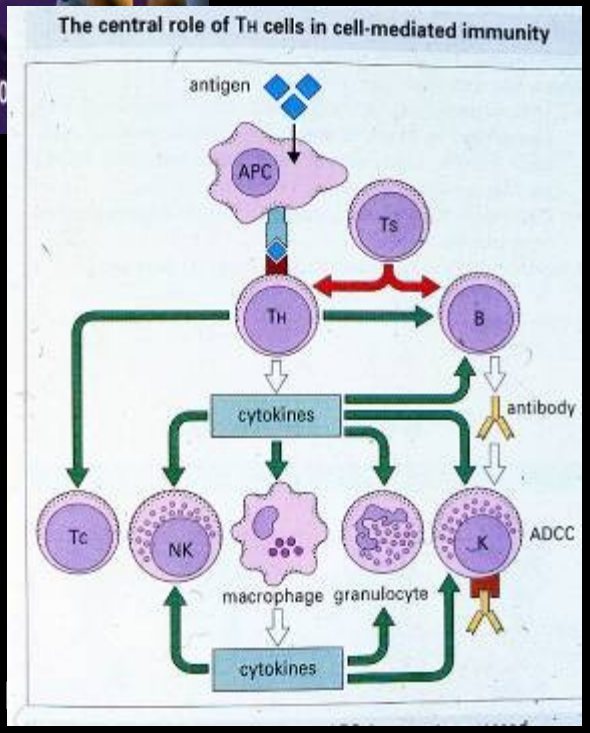
- “Virtual Explorer”, 1998
  - University of California, San Diego
  - Virtual environment for teaching basic Science
    - Software framework / Hardware platform spec.
    - Module #1: Immunology

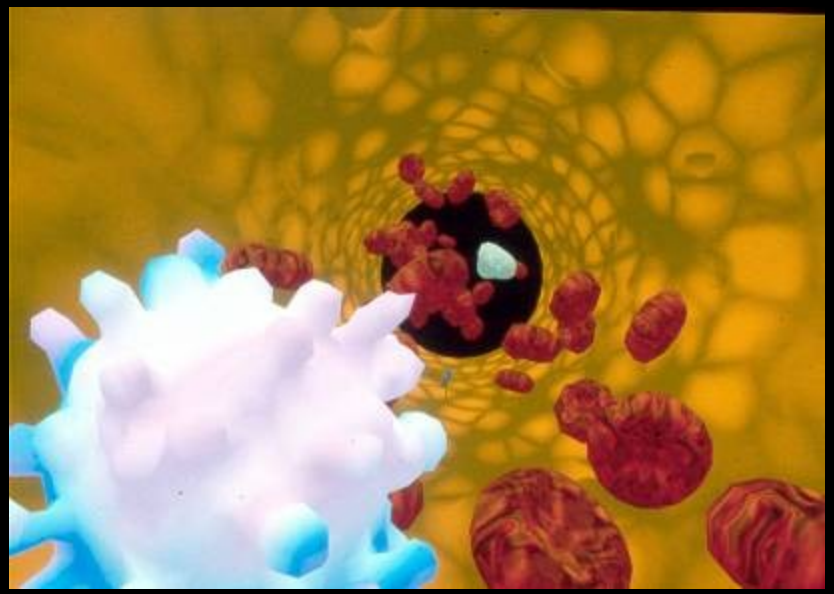





IMMUNOLOGY
FOURTH EDITION
ROITT • BROSTO


VIRTUAL EXPLORER


The central role of TH cells in cell-mediated immunity
antigen
APC
Ts
TH
B
cytokines
antibody
Tc
NK
macrophage
granulocyte
K
ADCC
cytokines

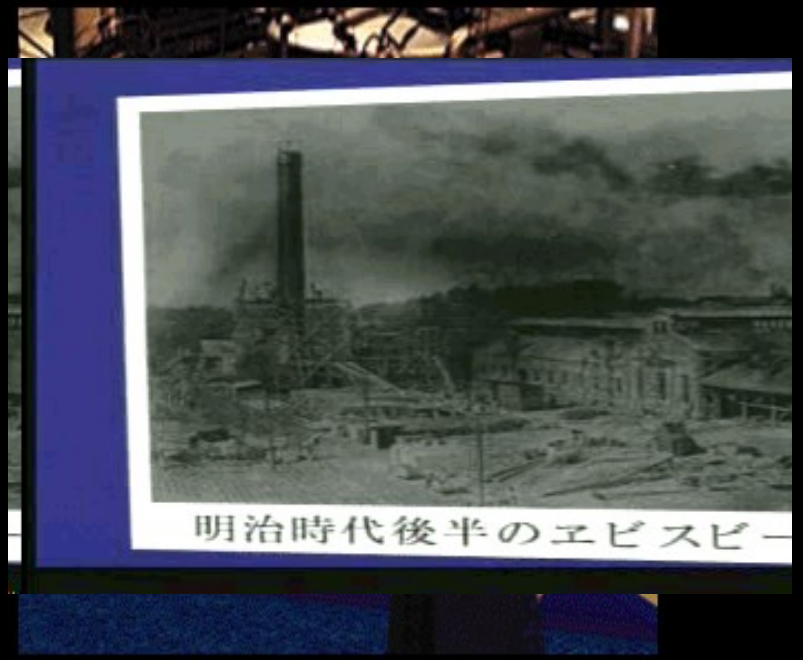


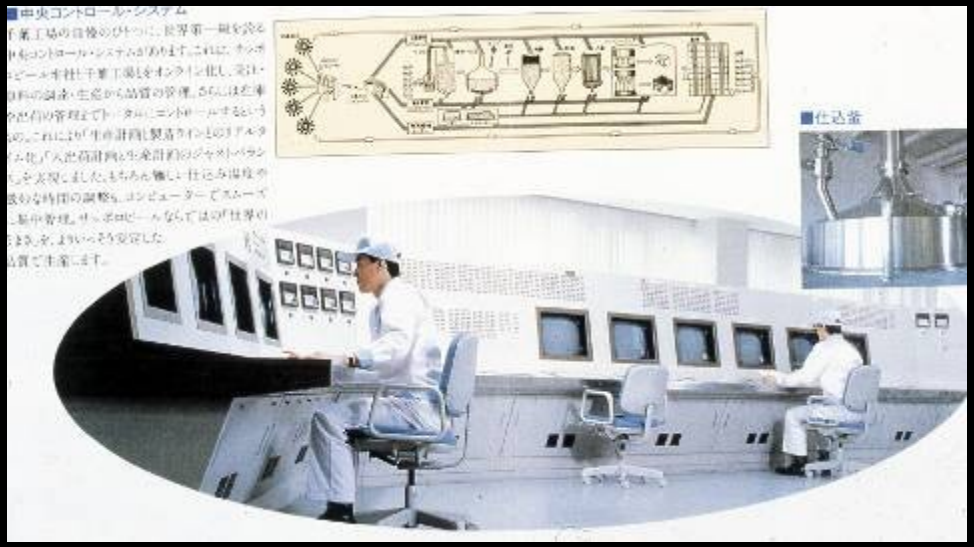

H
N
F


Life Tech
Theatre
operating room

Applications: Advertising

- “Virtual Brewery Adventure” (1994)
  - Telepresence Research, Inc.




■仕込釜

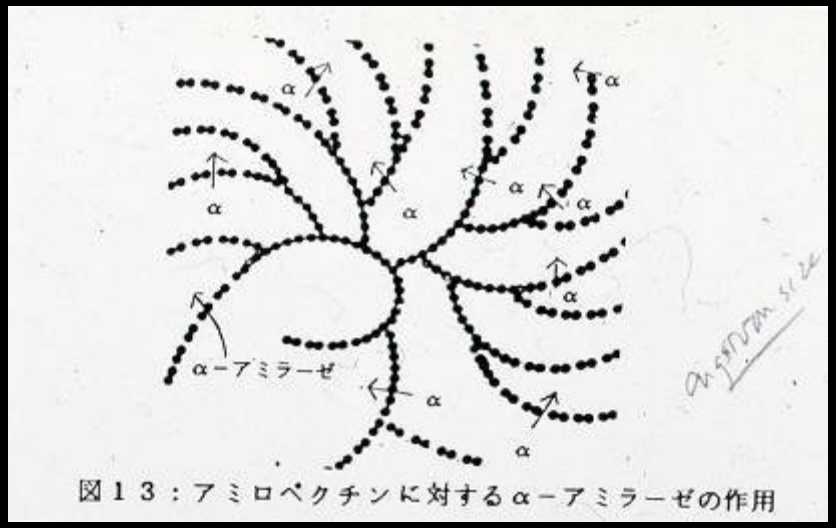
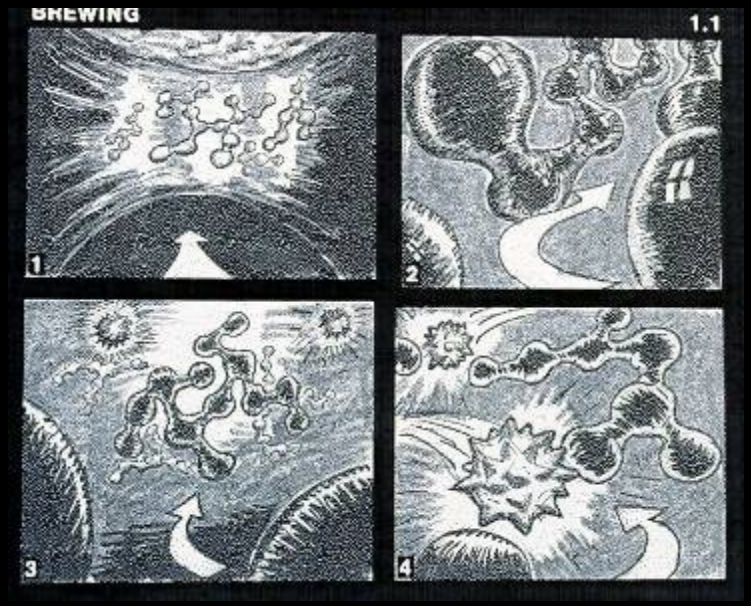
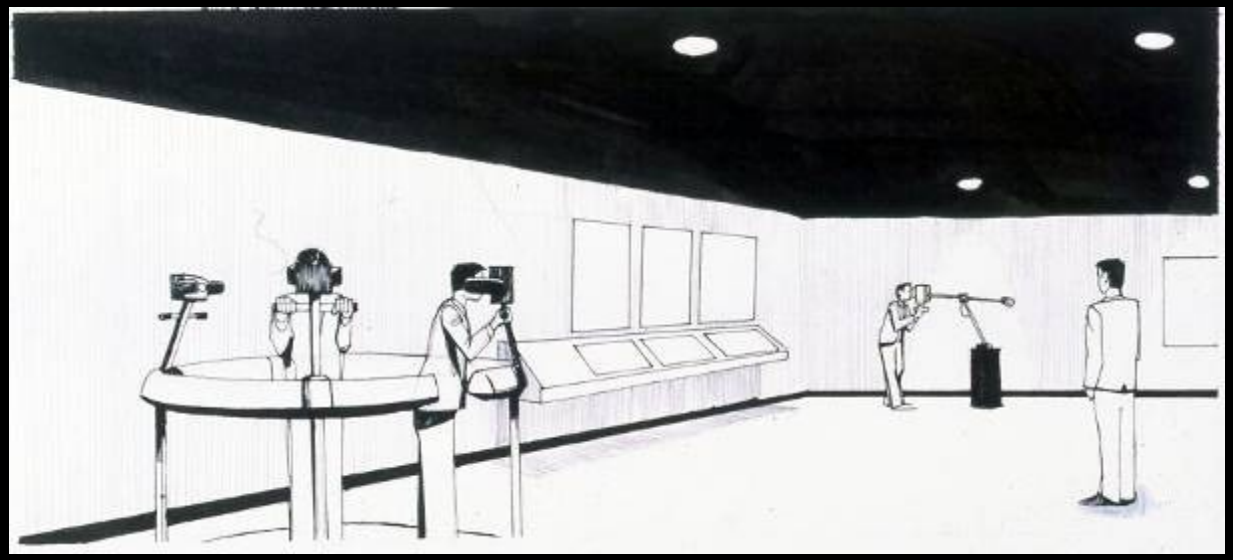
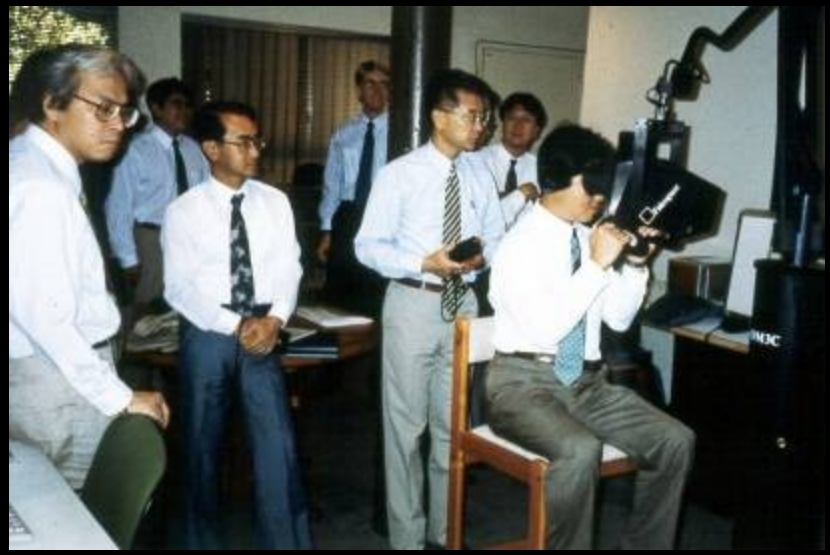


図１３：アミロペクチンに対するα－アミラーゼの作用



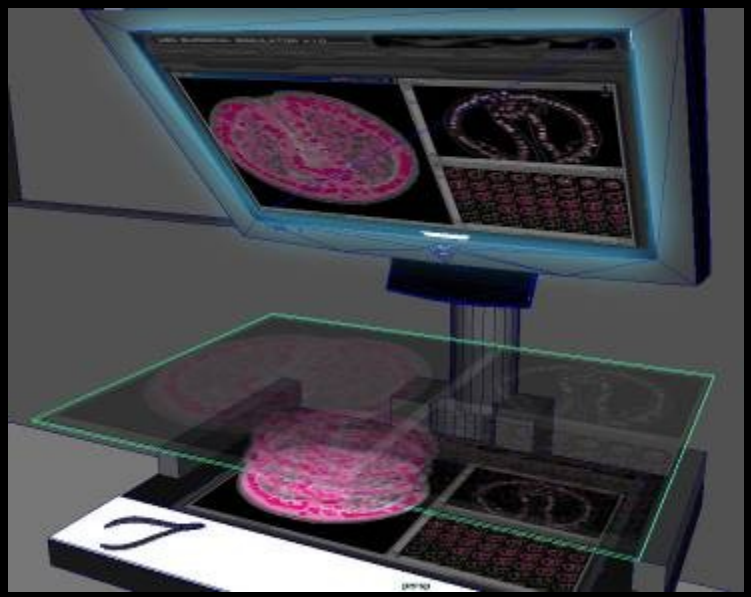


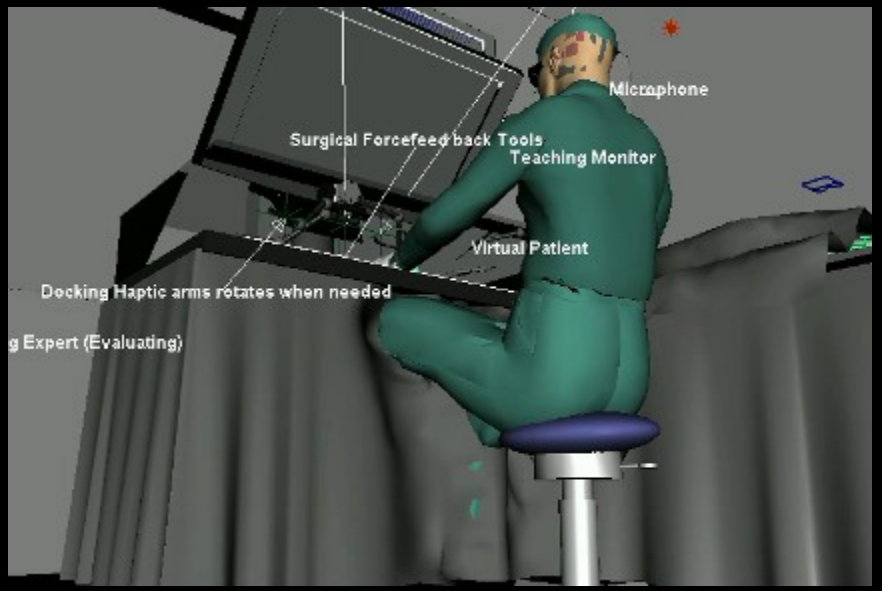


Applications: Medical

Applications: Medical

- "Surgical Simulator"
  - Keck School of Medicine
  - School of Cinema-Television
  - Rossier School of Education
  - Institute for Creative Technologies
  - Integrated Media Systems Center





Applications: Virtual Archives

- "MicroPresence" KEIO SFC
  - Micro-Archiving Project
  - Imaged Based Modeling
    - More accurate 3D models
    - Faster acquisition
    - Easier operation
  - Accepted for SIGGRAPH 2001

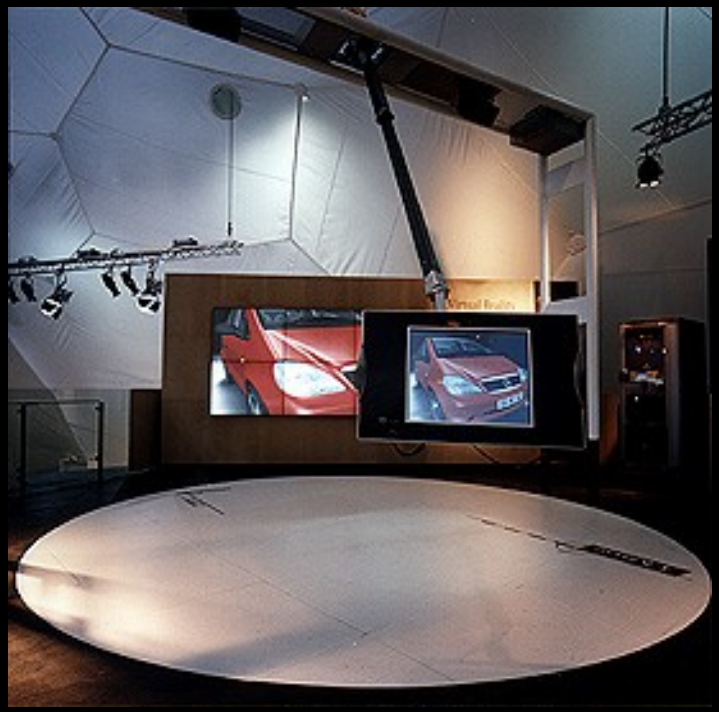
Applications: Education

- “ScienceSpace”, 1995
  - Team: NASA Johnson Space Center, George Mason University, and Univ. of Houston
  - VR microworlds for teaching science concepts
    - NewtonWorld
    - MaxwellWorld
    - PaulingWorld

–http://www.virtual.gmu.edu/

Applications: Industrial Design

- “ Virtual Car” - ART + COM (1998)



Applications: Entertainment

Applications: Heritage

- Computational Humanities & Virtual Heritage:
  - Creating intuitive, accessible tools and interfaces for more realistic and functional virtual scenarios with accurate historical, cultural, and social content.
    - *C. Cruz-Neira, Virtual Reality Applications Center, Iowa State University*

Future Directions

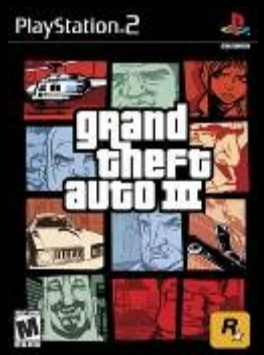
- Intelligent Environments
- Networked, Multi-User Virtual Spaces
- Personalization/Smart Spaces
- Linking Virtual Environments to the Physical World:

"ENVIRONMENTAL MEDIA"

Immersive Game Worlds

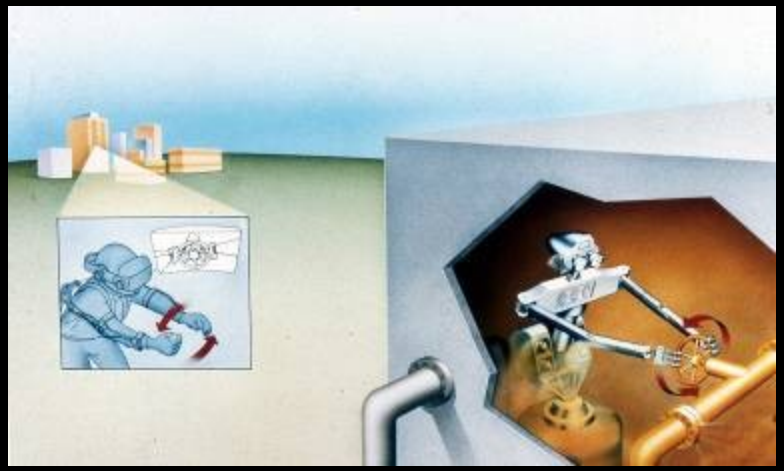
- " SimCity 2000", Maxis, Inc.

- "Grand Theft Auto", Rockstar games



- Quake "Friends"

Remote Presence



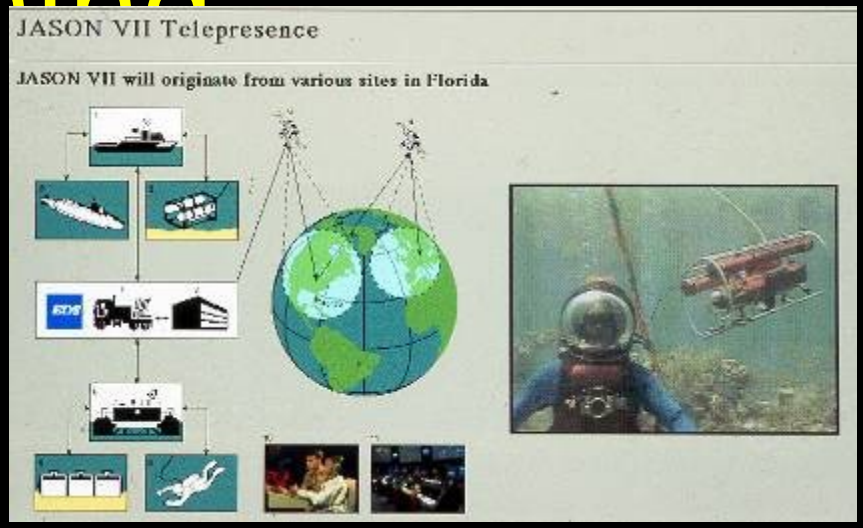
Minerva leads tours at the National Museum of American History Aug. 24 - Sept. 5. Photo courtesy Sebastian Thrun

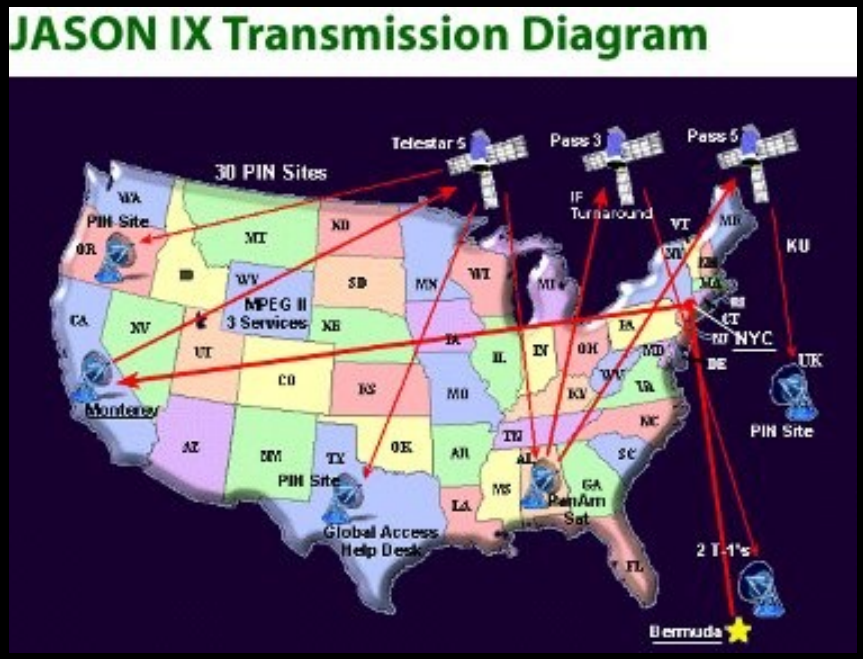
Remote Presence Applications

- “Telepresence Mobile Robot” (1991)
  - Telepresence Research, Inc.:

Interactive Distance Learning

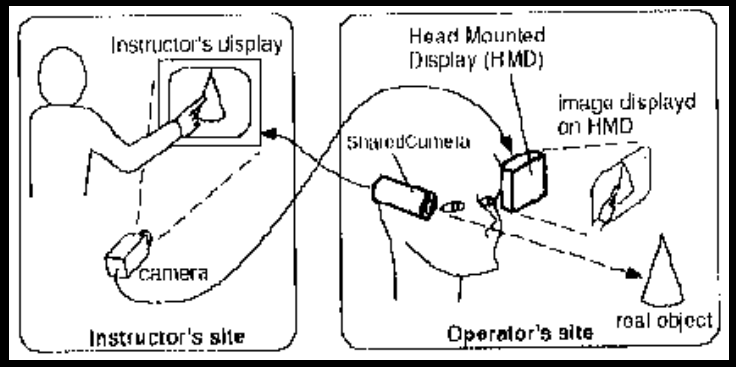
- "Jason Project"
  - JF & EDS (1990-99)
  - "Virtual Fieldtrip" - focus on science
  - Satellite broadcast
  - Limited interaction with remote devices





Remote Camera: Apps

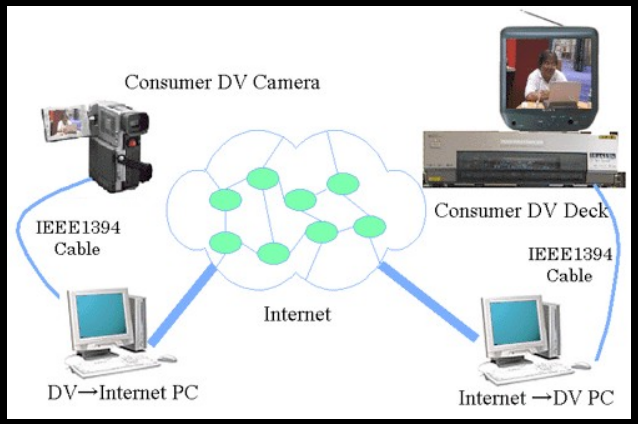
- “Spatial Workspace Collaboration”, Kuzuoka, University of Tokyo (1992)
  - Field technicians/remote expert collaboration



- “Mermaid Project”, CHSS (EU) 1996-99
  - Ship-based paramedic/remote doctor collaboration (“teleconsultants”)
  - Satellite transmission

Mobile Webcam

- "INSITE" Project - Keio SFC (99)
  - Real-time Interactive Telepresence System for Virtual Fieldtrips, Distance Learning, and Cross Cultural Interaction




alain mikli
3rd Eye

Telebuddy: Internet chat avatar

- ZGDV, Germany

Remote Presence by Mobile Phone

TAKARA DreamForce 01

FUJITSU MARON-1

Augmented Reality

- “ a form of virtual reality where the participant’s HMD is transparent, allowing a clear view of the real world”
- “any case in which the ‘real’ environment is ‘augmented’ by means of virtual objects (CG)”
- “augmenting natural feedback to the operator with simulated cues”

AR Background

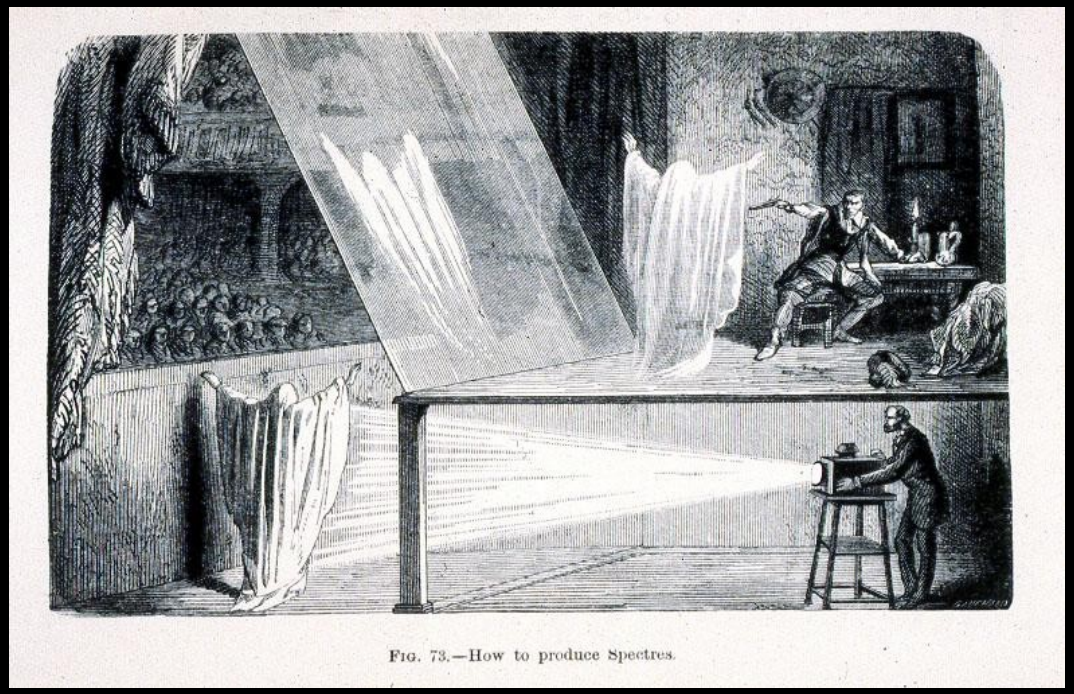
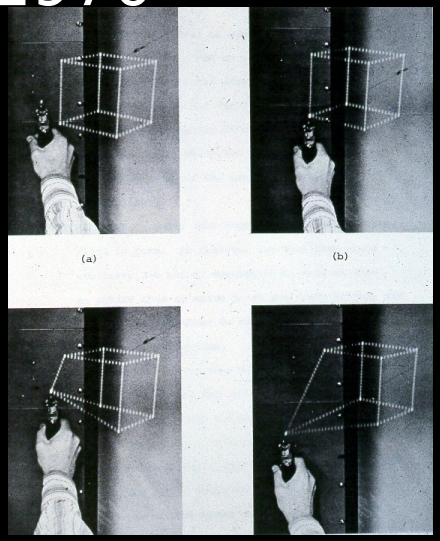


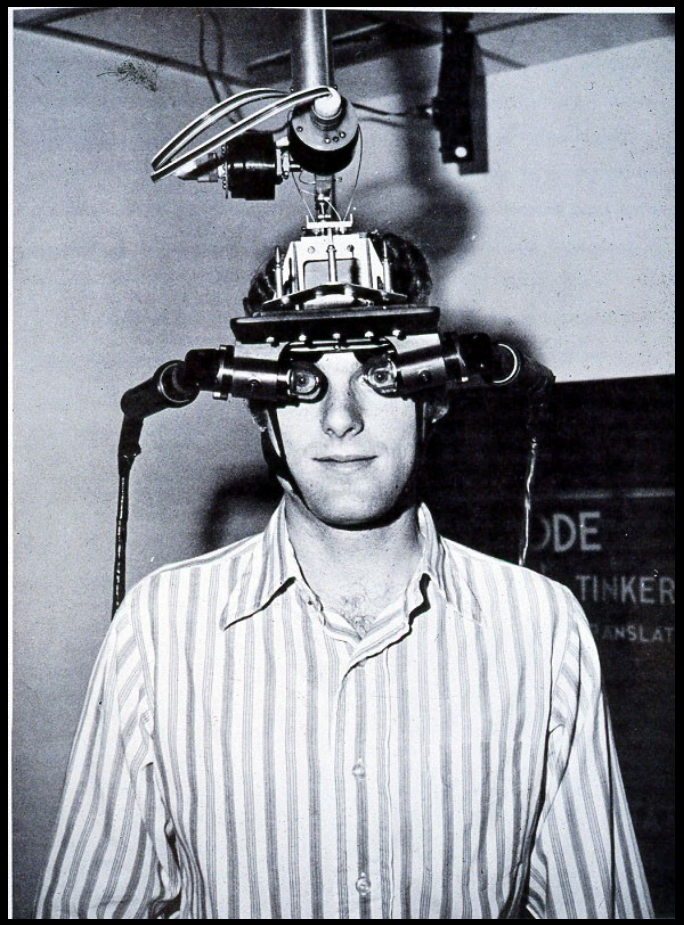
Fig. 73.—How to produce Spectres.

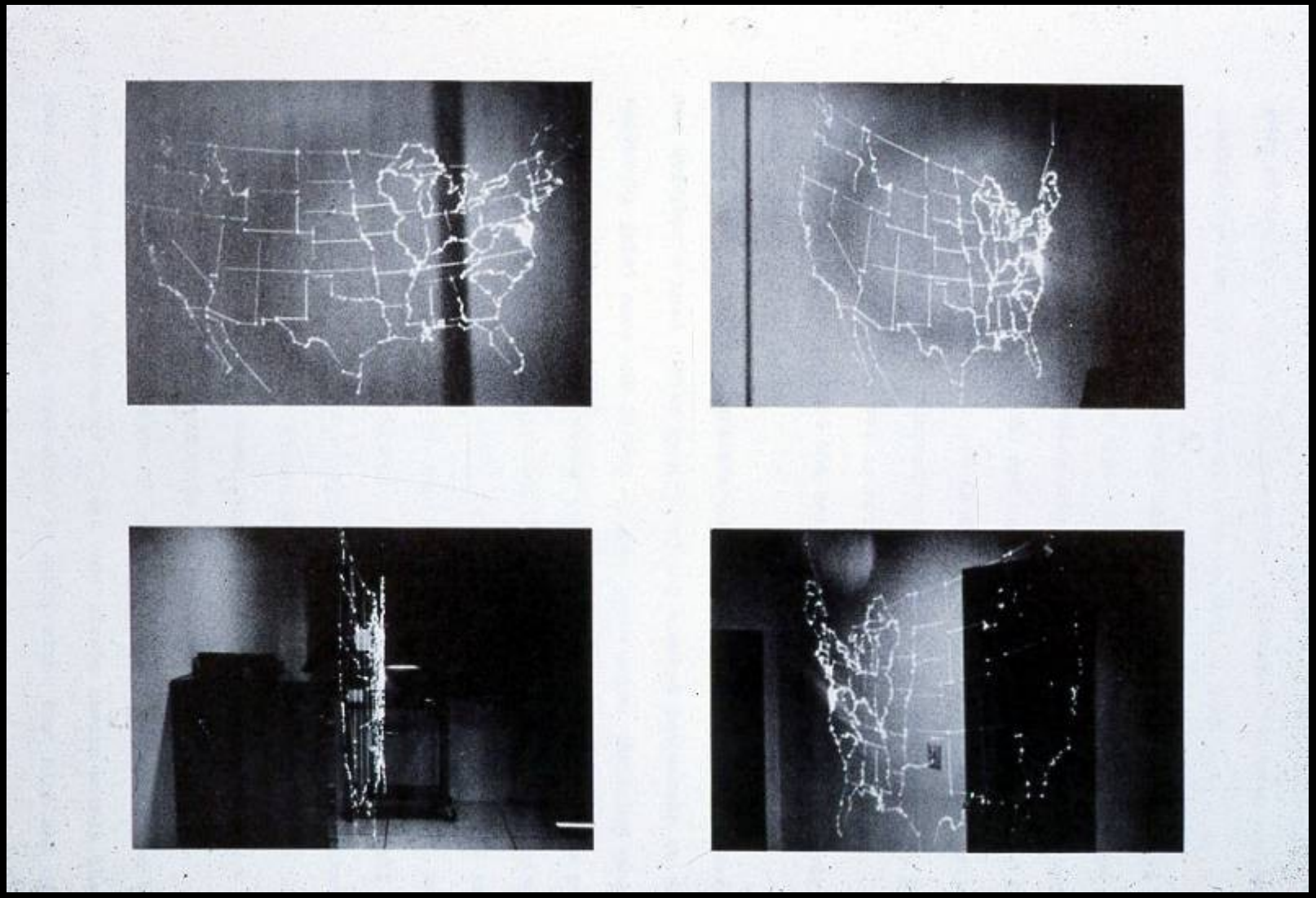
- Pepper’s Ghost Illusion

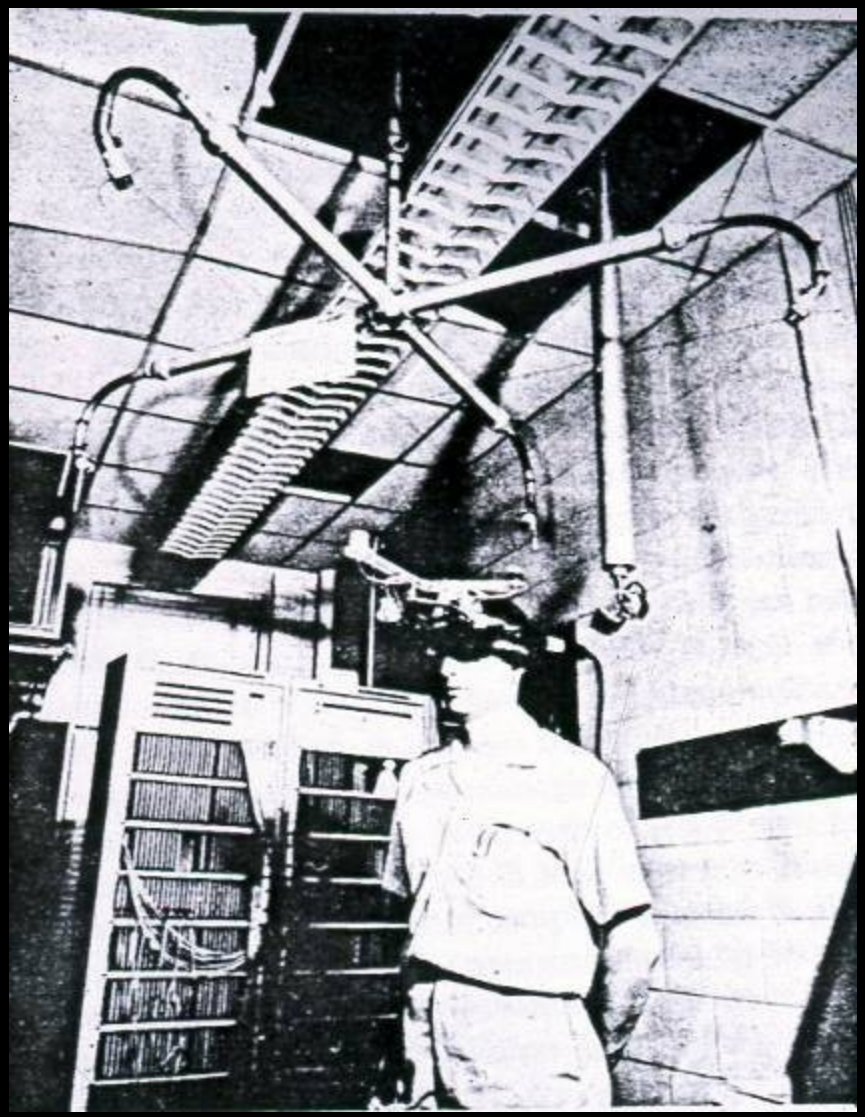
AR Background

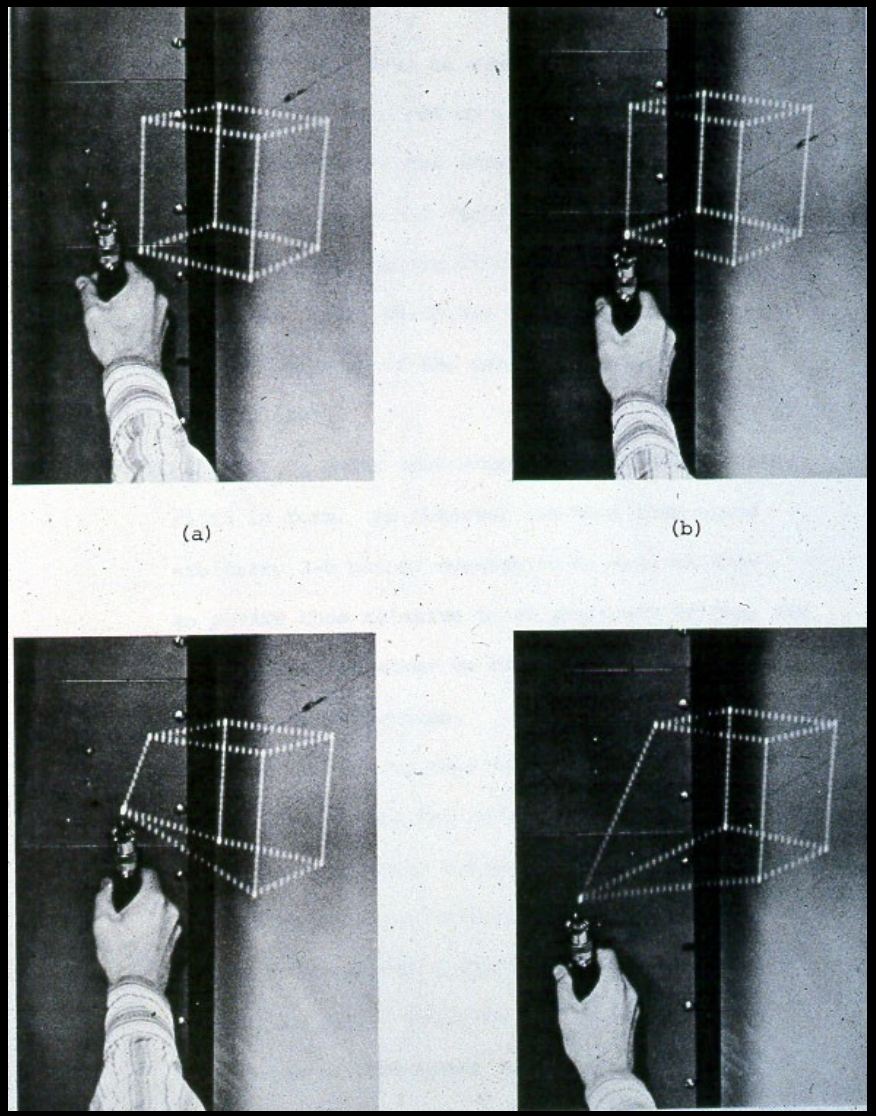
- Ivan Sutherland
  - Harvard/MIT 1969
  - Univ. of Utah, 1970









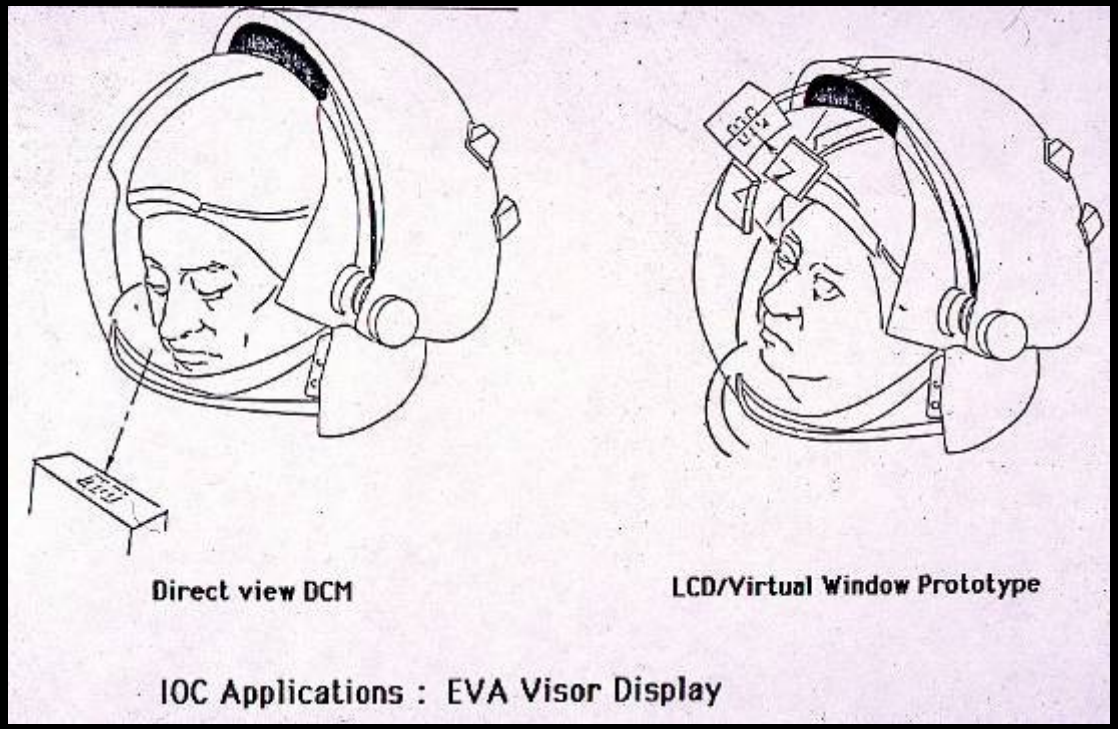

(a)
(b)

AR Background

- “Soft Keyboard”, Bell Labs, Ken Knowlton, ~1975

AR Background

- NASA Ames Research Center, 1986



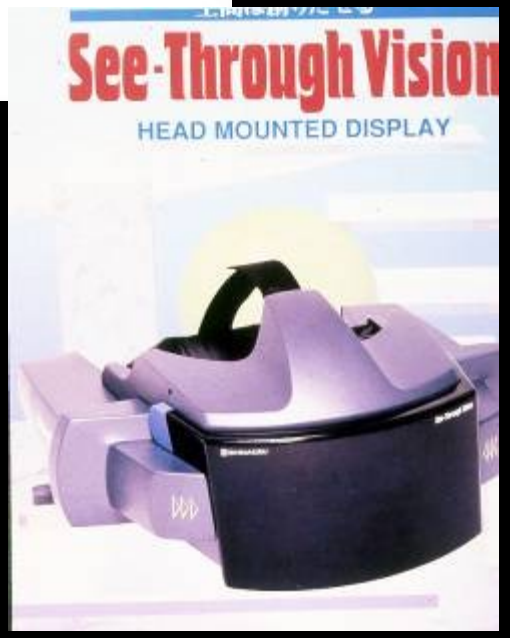
AR Background

- “VCASS” – US Air Force, 1986

AR System Components

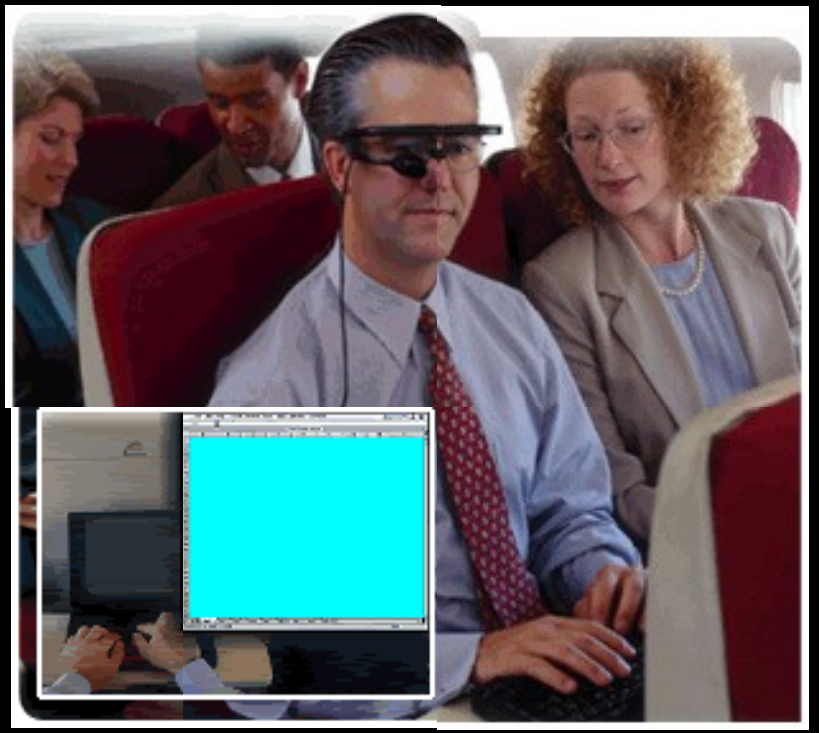
- Data Collection
- Data Transmission
- Data Storage and Processing
- Data Displays
- Input Mechanisms

Data Displays



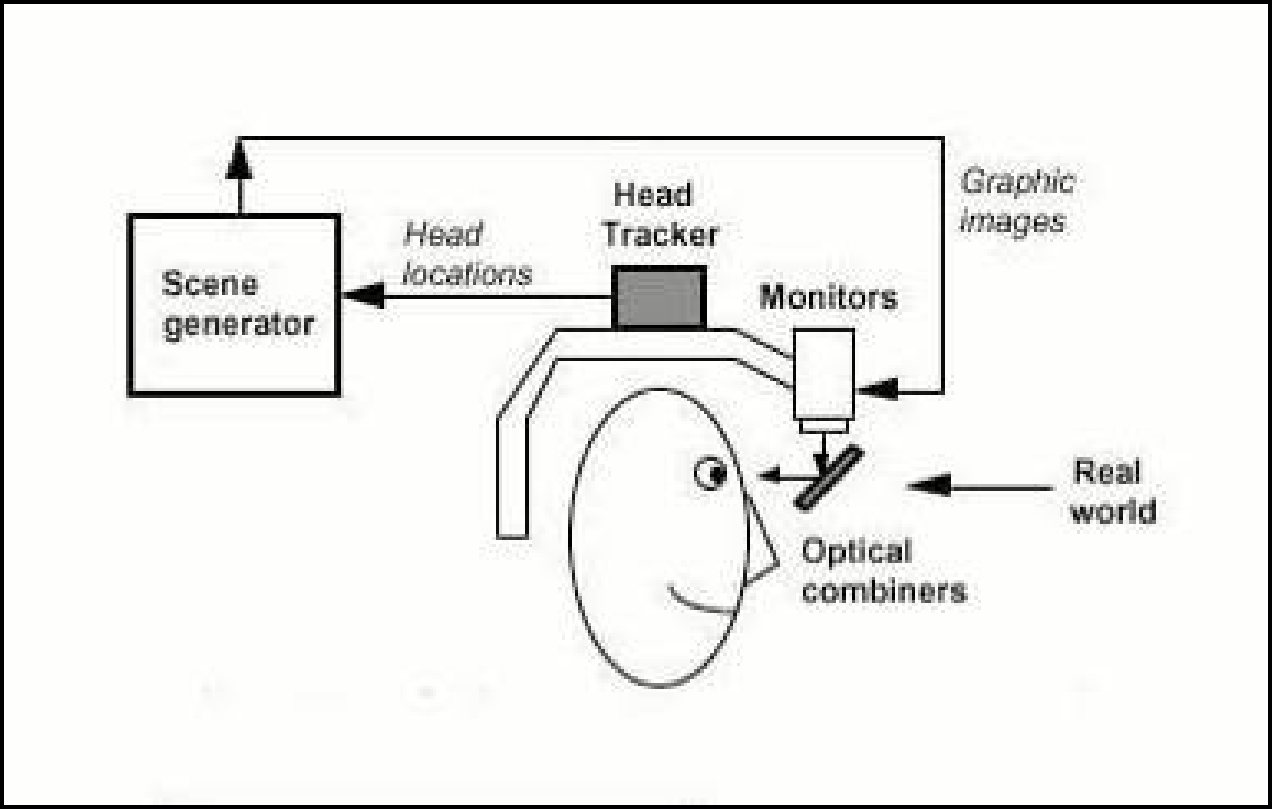
Data Displays: Monocular

- Colorado Microdisplay, Inc.
  - SVGA to XGA
  - Used by:
    - MIT LCS
    - IBM Tokyo



- www.comicro.com/

Data Displays: Optical See-Thru

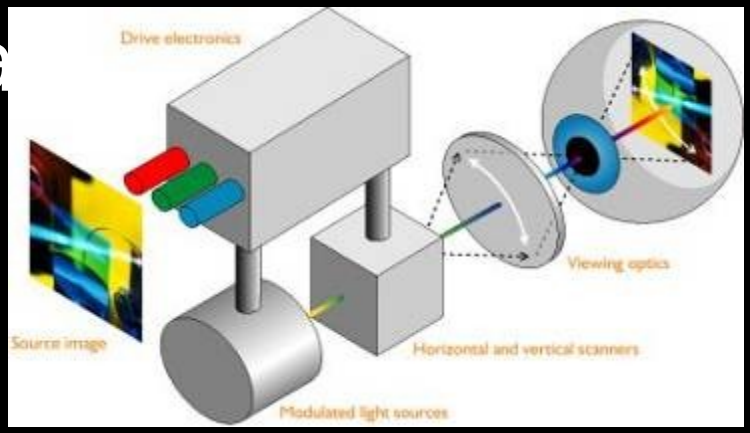


Data Displays: Optical See-thru

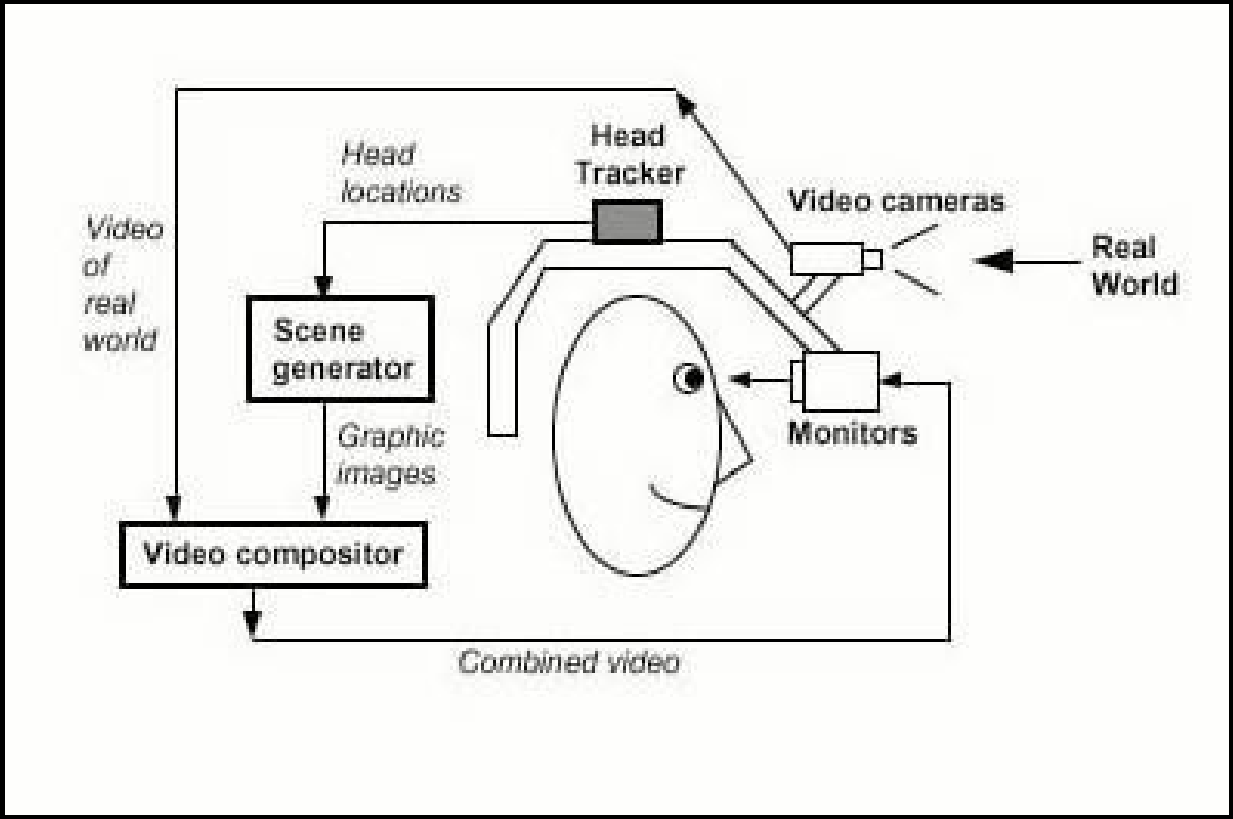
- MicroOptical Corp.
  - QVGA (320x240)
  - See-around display
- http://www.microopticalcorp.com/eyefaq.htm

Data Displays

- Retinal Scanning Displa
  - Microvision
  - http://www.mvis.com/



Data Displays: Video See-Thru



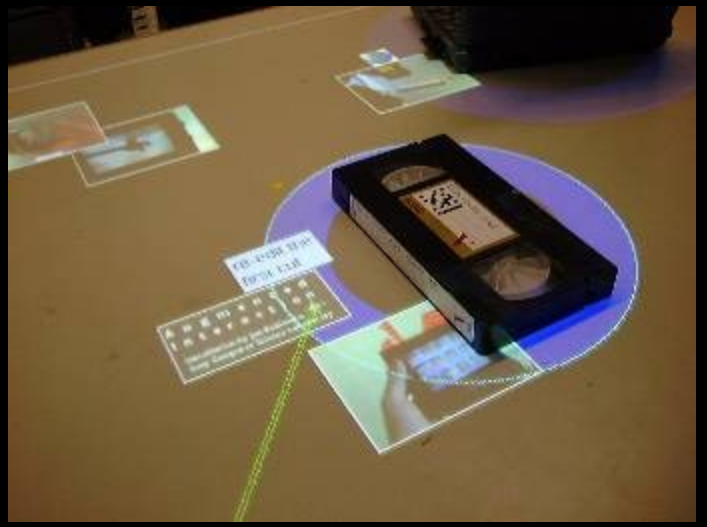
Data Displays: Video See-Thru

AR Research & Applications

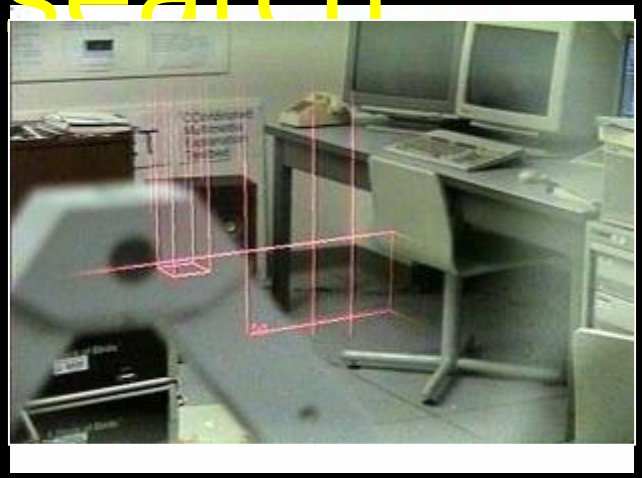
- SONY CSL
- Columbia University
- Mixed Reality Systems Lab
- ATR/HITLab
- MIT Media Lab

AR Research

- SONY CSL
  - "NaviCam" (94)
  - " Augmented Surfaces" (99)
- www.csl.sony.co.jp/person/rekimoto.html



Augmented Reality Research



Columbia Univ., USA - “Touring Machine”
- “Architectural Anatomy”

AR Applications

- Airplane assembly, Boeing.

AR Applications

- Medical applications, University of North Carolina

AR Applications

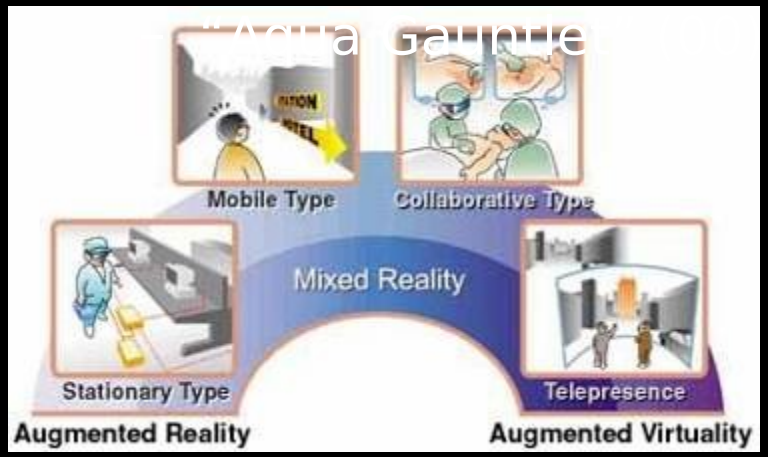
- AR Museum, Univ. of Tokyo

AR Applications

- Virtual Showcase
  - Fraunhofer Institute for Computer Graphics, Germany

AR Research & Applications

- Mixed Reality Systems Lab
- Yokohama, Japan
- http://www.mr-system.c
  - “AR2 Hockey” (98)
  - “RV Border Guards” (99)
  - “Agua Gaunue” (00)



AR Applications

- “Tiles” MR Interface Design, SONY CSL

AR Applications

- 3DLive – National University of Singapore

Simon J.D. Prince
Adrian David Cheok
Farzam Farbiz

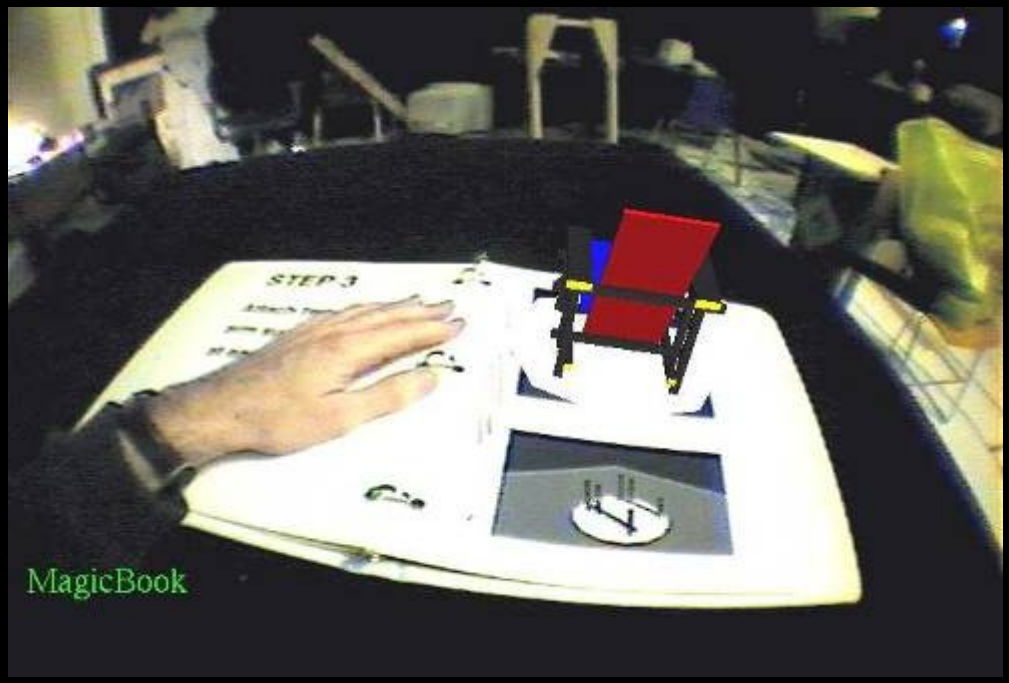
NATIONAL UNIVERSITY
OF SINGAPORE
mixed reality + wearable
technology lab

Mixed Reality Art

- Taisuke MURAKAMI
  - “Contact Water”, 200

http://www.mr-system.co.jp/canon-mr/contact_water_j/s_main1.html

AR Research & Applications



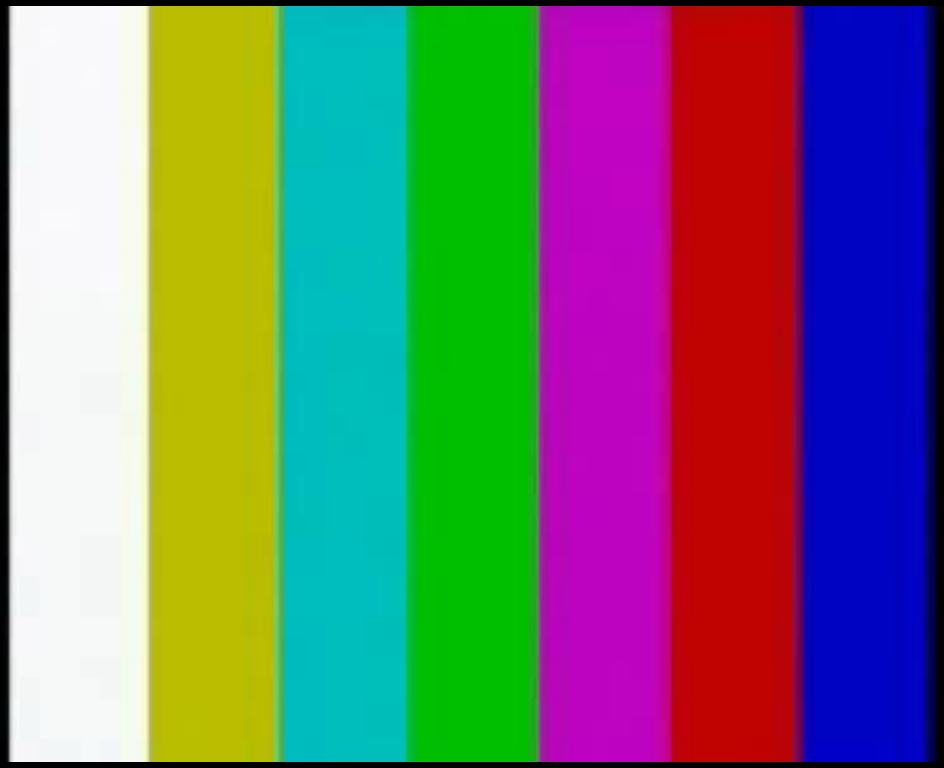
- ATR, Japan &

HITLab, Univ. of Washington

  - –“Magic Book”

AR Applications

- Arbeca AR, Univ. Llieda, Spain



AR Applications

- “ Remembrance Agent”
  - B. Rhodes, MIT Media Lab
  - Context-aware computing

```
Jimminy-header <e15-384d|josh weaver||Fri, 2 Jan 1998 15:02:28 EST>

Wearables group meeting notes:
```

```
--**-Emacs: wearfolk       Jan 7, 3:02pm | e15-384d(2) | josh weaver |  |   (Tex
1: 0.49 thad               | 19 Dec 97 | ar paper for mobil networking and app j
2: 0.36 josh weaver        | 16 Dec 97 | finger-tracking
3: 0.20 rhodes             | 12 Dec 97 | vtt electronics talk
  *remem-display*
remembrance agent started.
```

http://lcs.www.media.mit.edu/projects/wearables/context.html

AR Applications

- “ Three angry Men” – Georgia Tech
  - AR version of the famous twentieth-century play, “Twelve Angry Men,”
  - Dramatic narrative that allows the user to experience the same story from multiple points of view.

Interactive Media Seminar

Ubiquitous Computing & Environmental Media

CTIN 511 Fall 2004

Interactive Media Division

Linking Physical and Virtual Worlds

- Tangible Media Group, MIT Media Lab

  http://tangible.www.media.mit.edu/groups/tangible/

  - “We live between two worlds: our physical environment and digital space. The Tangible Media Group at the MIT Media Lab focuses on the seamless couplings between physicality and virtuality”

  - “musicBottles”, 19
  - “ Pinwheels”, 199

Linking Physical and Virtual Worlds

- “Dangling String”, Jerimijenko (1995)
  - 8 foot plastic string attached to electric motor
  - Motor connected to PARC ethernet
  - Bit traffic drives motor

http://nano.xerox.com/hypertext/w .htm

Linking Physical and Virtual Worlds

– Tangible Media Group, MIT Media Lab

- “Strata”, http://www.media.mit.edu/~ullmer/projects/strata-icc/
- “a computationally-augmented physical model of a 54-story skyscraper that serves as an interactive display of electricity consumption, water consumption, network utilization, and other kinds of infrastructure. Our approach pushes information visualizations into the physical world, with a vision of transforming large-sca o new kin ce

Taxonomy

- Ubiquitous Computing
- Pervasive Computing
- Mobile Multimedia
- Wearable Computing
- Augmented Reality/Mixed Reality

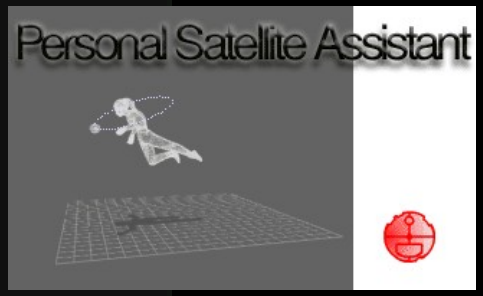
Pervasive Computing

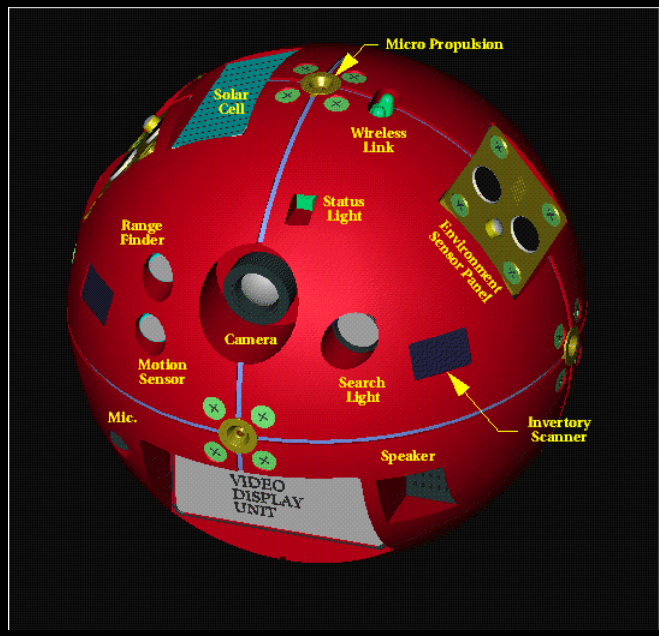
- “Hal”, 2001:

- “Holodeck”, St

Pervasive Computing

- Personal Satellite Assistant, NASA 1999



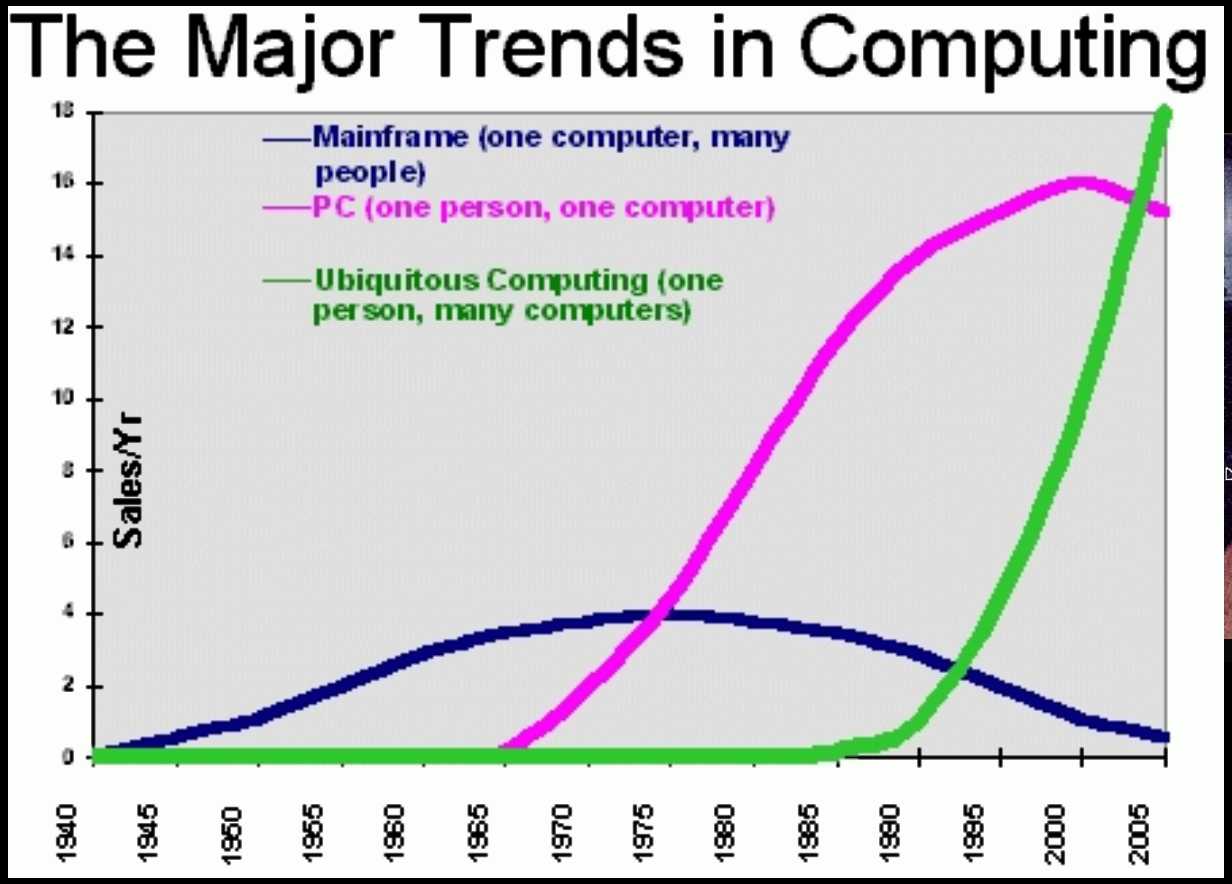


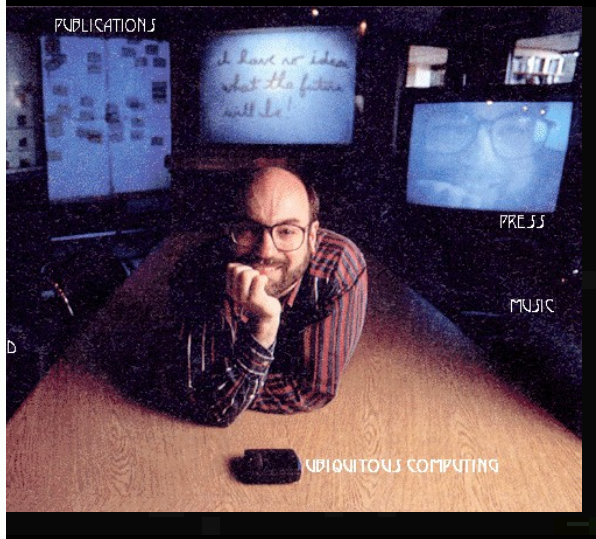
Ubiquitous Computing

“Ubiquitous computing is roughly the opposite of virtual reality. Where virtual reality puts people inside a computer-generated world, ubiquitous computing forces the computer to live out here in the world with people. Virtual reality is primarily a horse power problem; ubiquitous computing is a very difficult integration of human factors, computer science, engineering, and social sciences. “

- Marc Weiser

Ubiquitous Computing





http://www.ubiq.com

Information about (other) Places


2:24PM
200m
日本橋
丸の内
2:17PM
VICS FM


呉服橋
江戸橋JC
100m
12:45
日本橋
東京駅中央口
京橋JCT

Information in Places

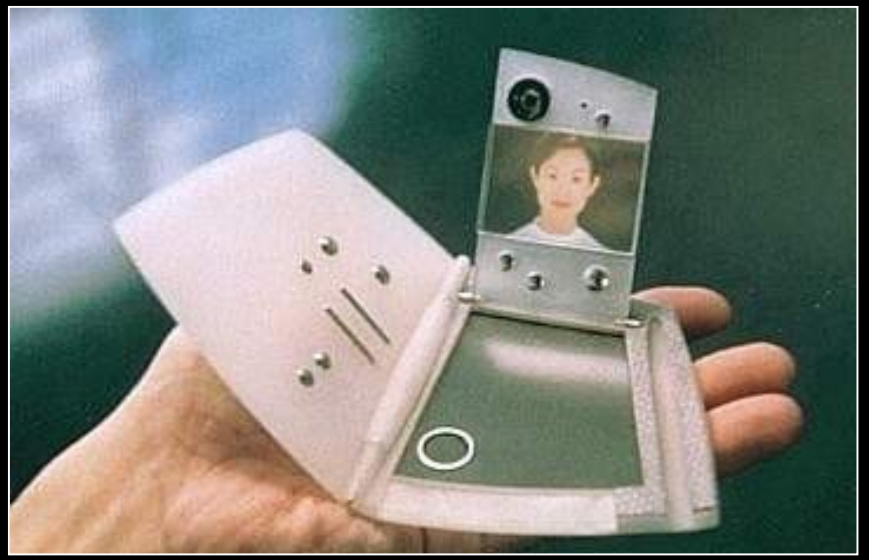
- Becoming More Common:
  - Embedded Digital Data & Location-based Services
    - Ubiquitous Computing/Pervasive Computing
    - PDAs, Smart house,
    - GPS, CarN

Linking Physical and Virtual Worlds

- Opportunity:
  - New capabilities for unique out-of-classroom educational experiences available to anyone, at anytime with the added benefit of being embedded in the rich context of specific places.

- Enabling Technologies:
  - Augmented Reality/Mixed Reality
  - Wearable Computing
  - Mobile Multimedia

Location Based Services & Mobile Multimedia



Mobile Platforms

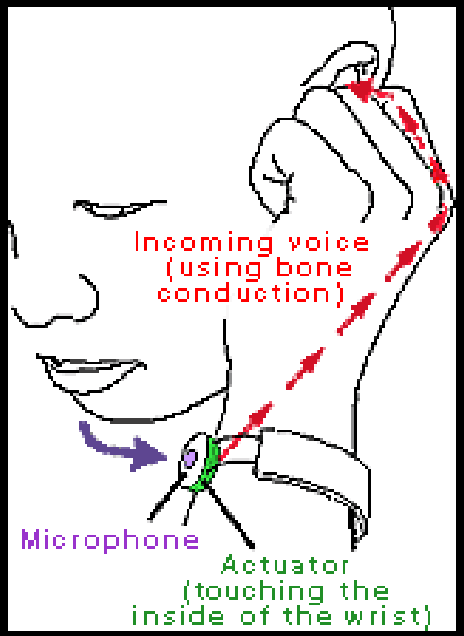
- Nokia N-gage

- Sharp auto stereoscopic mobile pho

- GPS phone

Mobile Media

- Docomo Prototypes

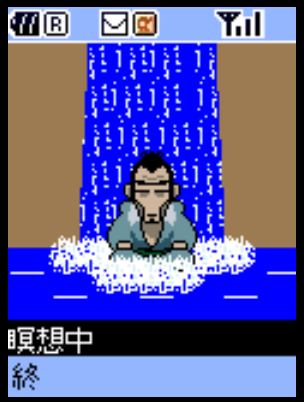


Mobile Content

- Mobile song identification service
  - “Shazam” (www.shazam.com)
- Mobile camera input to Broadcast TV
  - BBC News
  - Jphone”Sha-mail” and Aichi TV (“Syamekke!”)
- Mobile phone input to PS2 console
- Mobile blogging (Web demo)
  - Blogmapper
  - EachDay.net
- Mobile music download - MP3 clips
  - Chaku-uta (Japan)
  - Xingtone (US)

Mobile Games

- Samurai Romanesque – Dwa



Mobile Games

Wearable Environmental Media Project

- Objectives
  - Prototype for location based services over next generation wireless networks.
  - Augment user's interaction with physical world
    - Application scenarios
    - Interface & interaction design guidelines
- Technologies
  - HMD Browser
  - Keitai Denwa Browser
- 4G Target System

Wearable Environmental Media Project

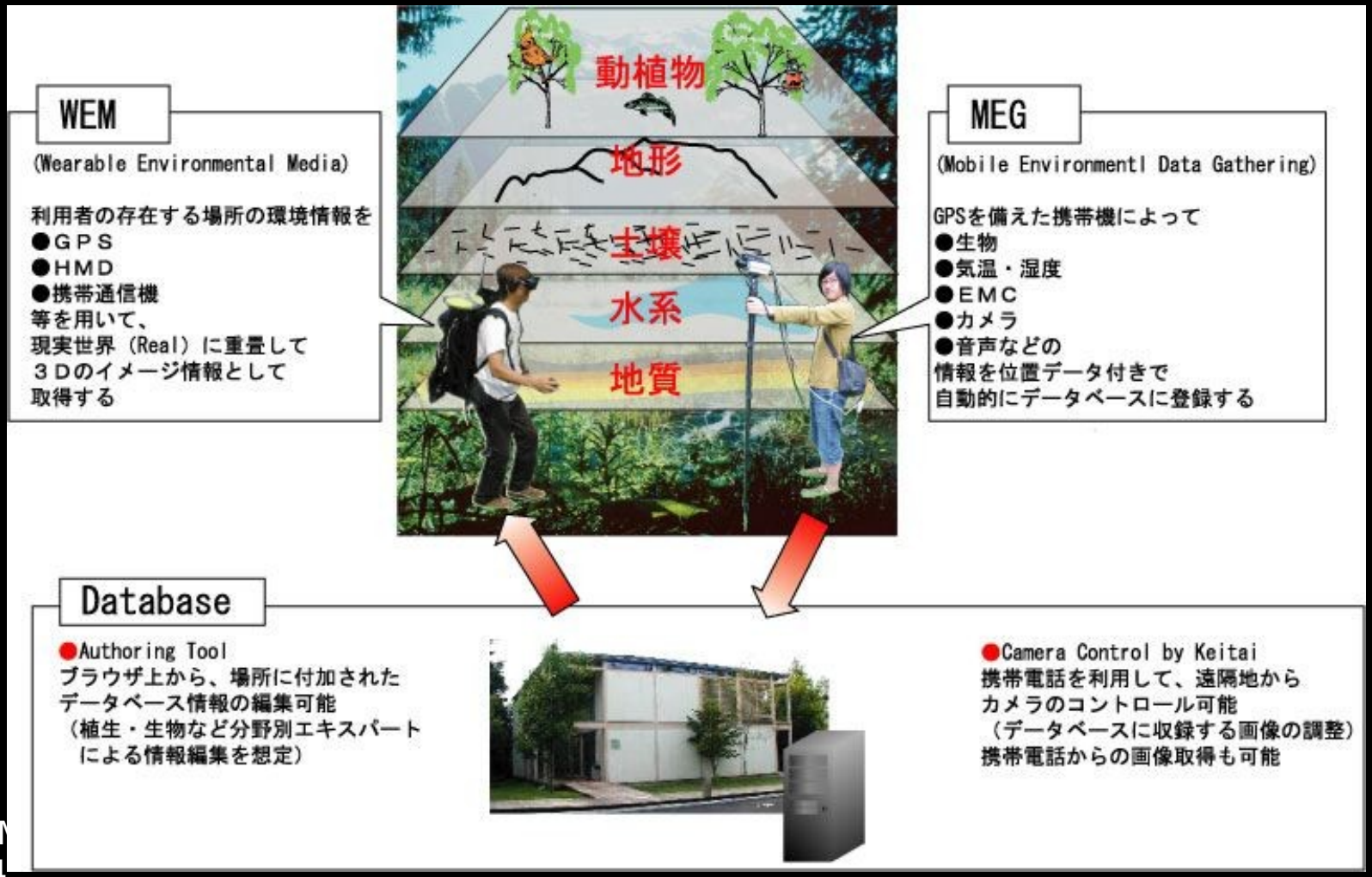
SFC Campus test site

DoCoMo House Lab

Wearable Environmental Media Project

Wearable Environmental Media Project

- Version 2.0 Interface
  - Data organized in “layers” (GIS model)



Wearable Environmental Media Project

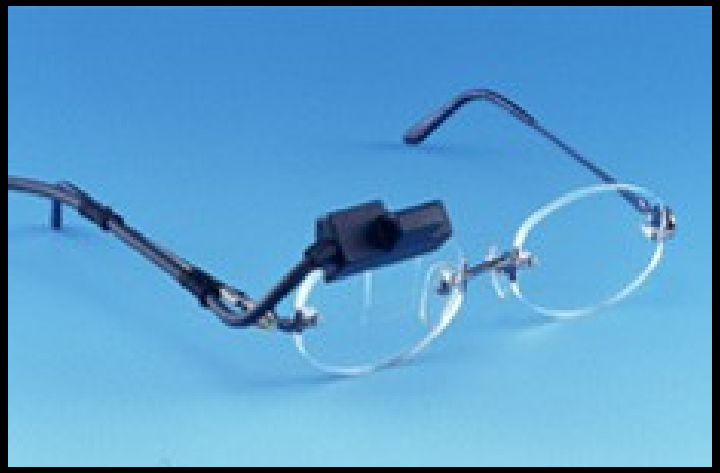
- Version 2.0 Interface
  - Java phone control interface
    - Select data layer(s)
      - Expert
      - Sensor
        - » Mobile stations
        - » Static stations
      - Short Mail
    - Cycle through icons

Wearable Environmental Media Project

- Version 3.0 HW
  - Stable headmount
  - Adjustable cameras
  - Lighter backpack

Wearable Environmental Media Project

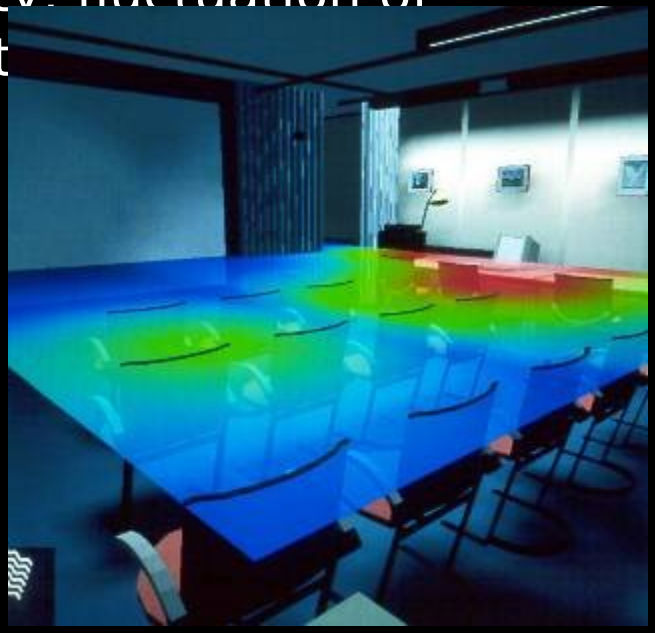
- Now Evaluating:
  - Minolta Holographic See-thru Browser
    - QVGA resolution
    - Monochrome
  - MicroOptical Clip-on Display
    - VGA resolution
    - Color




Mobilemag.com

MEG Project: Data Capture

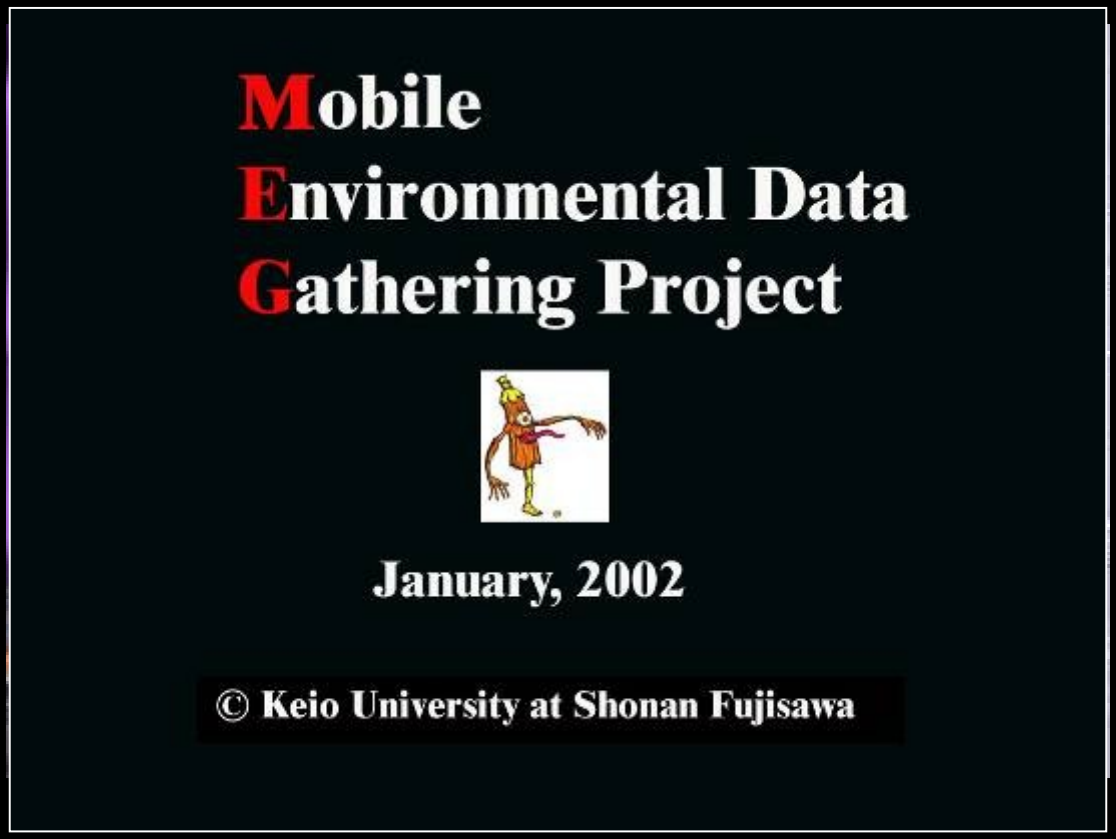
- 3D Visualization of Real-time Sensor Data
  - Capture range of basic environmental factors (air-quality, pressure, moisture, air and soil temperature, rainfall, wind activity, fluctuation of diat

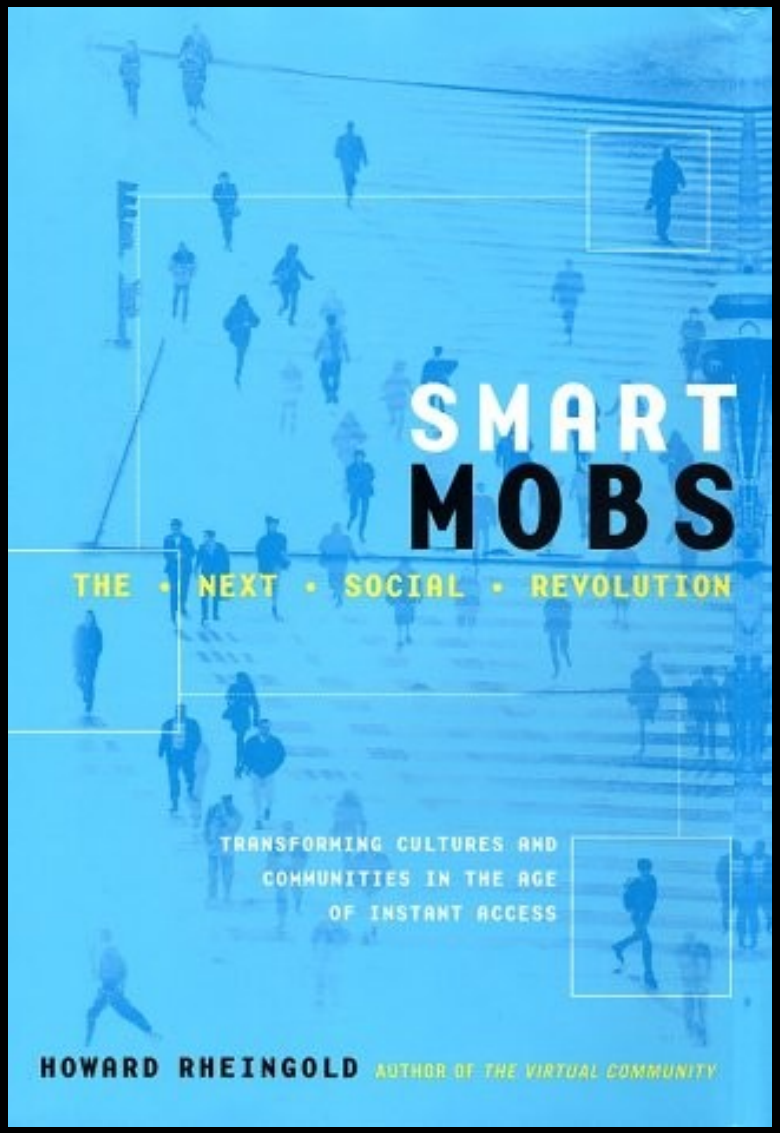


ΞG Project: Data Capture & Field Authoring

- Mobile Sensor Stations
  - GPS
  - Video/Still
  - Audio/voice
  - Text
  - Sensors
    - Temp
    - UV
    - Humidity
    - Light
    - Air quality
  - Wireless etherne
  - Axis Serial Serve

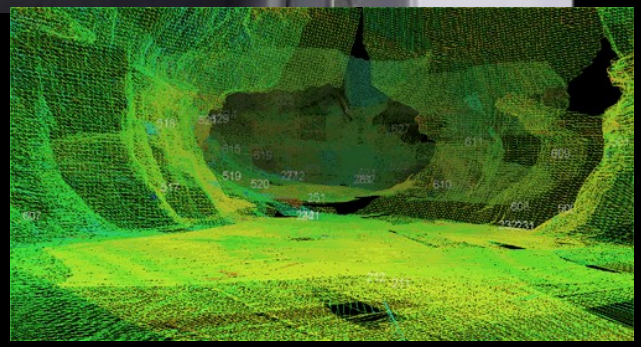
MEG Project: Data Capture




SMART MOBS
THE • NEXT • SOCIAL • REVOLUTION
TRANSFORMING CULTURES AND COMMUNITIES IN THE AGE OF INSTANT ACCESS
HOWARD RHEINGOLD AUTHOR OF THE VIRTUAL COMMUNITY

MEG Project: Data Visualization

- Visualization Authoring System
  - 3D Site model
    - Cyrax laser scanner
    - ±6 mm @ 1.5m - 50m range
  - 3D Web interface
    - Preview data for WEM
    - Data driven model
    - Interactive annotation
    - “Citizen science”
  - On-site viewing
    - WEM browsers



Future Scenarios

“Soon you'll be able to post a message in the air wherever you go…

Drivers involved in an accident will post a message in the air over the scene so that in-car satellite navigation systems can warn other motorists to steer clear of the area. Sailors could warn each other of shifting sandbanks that might ground an unsuspecting ship. And food-lovers could post messages outside a restaurant door, giving subsequent visitors an instant endorsement-or a warning to take their custom elsewhere. “

- New Scientist 12/01/01

Future Scenarios

WorldBoard Project (1996)

- “WorldBoard is a planetary infrastructure for associating digital information, tools, and services with PLACE–a location on the planet, people and/or objects. Any person with access to a Web server can attach their content to any PLACE. A person with a mobile computer would access the content by knowing where they are on the planet, or detecting people and objects in the nearby environment. It is based on Internet technologies.”

  - **“Information in Places”** – J.C. Spohrer
    - » http://www.research.ibm.com/journal/sj/384/spohrer.html
  - **“What comes after WWW?”** - J.C Spohrer
    - » http://www.worldboard.org/pub/spohrer/wbconcept/default.htm

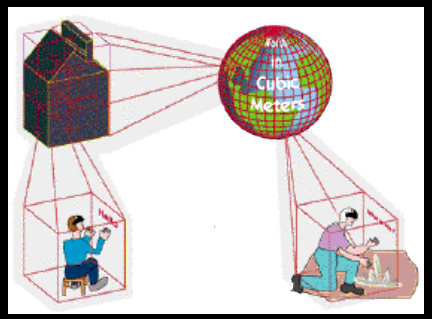
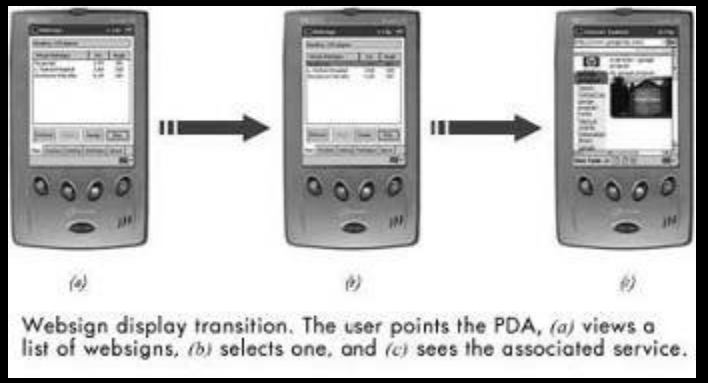


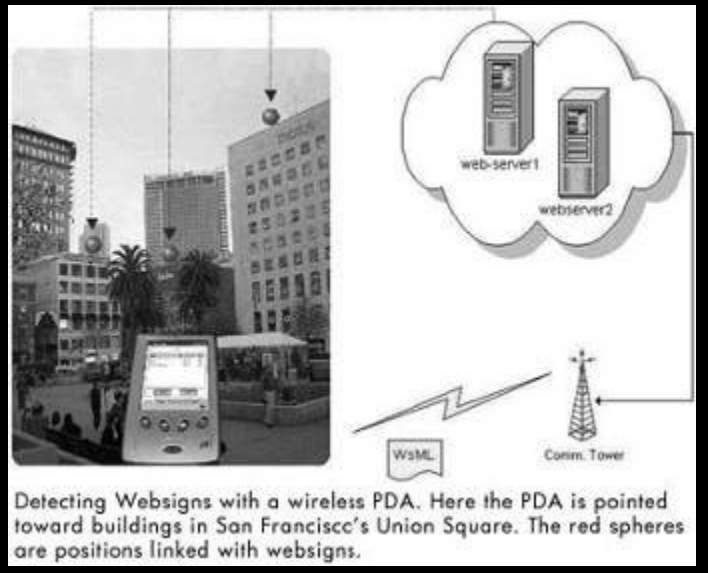
Figure 2 WorldBoard might help avoid accidental disruption of buried infrastructure.

Location Based Services

- HP labs “Websigns”



Websign display transition. The user points the PDA, *(a)* views a list of websigns, *(b)* selects one, and *(c)* sees the associated service.



Detecting Websigns with a wireless PDA. Here the PDA is pointed toward buildings in San Francisco's Union Square. The red spheres are positions linked with websigns.

Location Based Services

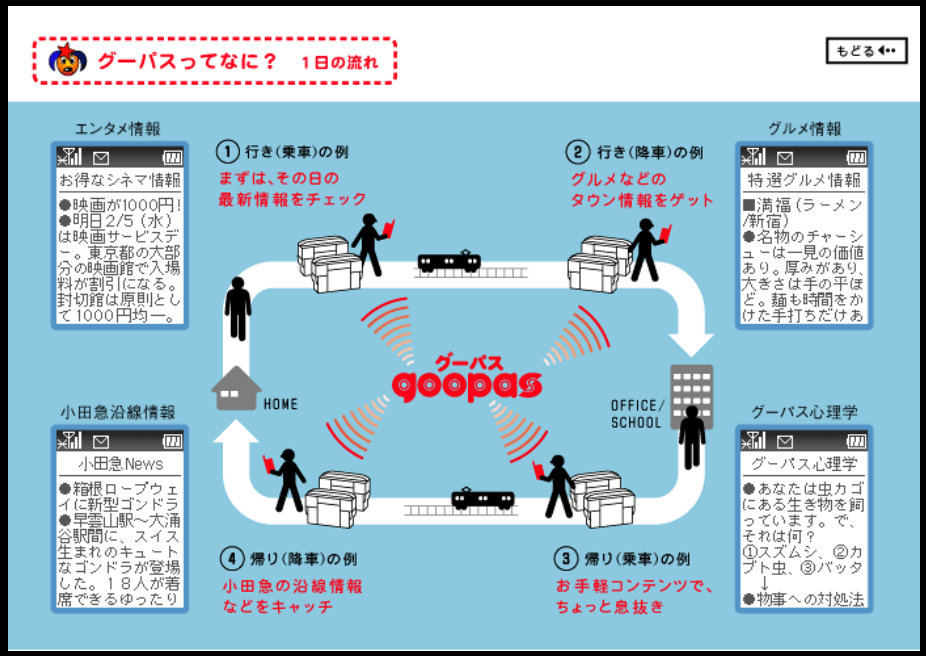
- Enhanced spectator experiences
  - Narrowcast data and viewpoints in sports venues

- Aspen Concert Companion (2003)

- Arena Programme (2002)
  - Makitalo Research

Location Based Services

- Goopas System (2002)
  - Location specific service combines rail pass and mobile phone
  - “Context Marketing” with PUSH email
    - Events, sales promotions, adverts



Location Based Services

- “R-Click” – NTT Docomo (2003)

"Koko Dake (Area Limited) Click" While standing in any of approximately 10 to 20 areas (cells) in Roppongi Hills, the user clicks a button on their RFID tag to receive information about that area. The user receives information tailored to their specific interests based on personal data that they pre-register.

"Mite Toru (Watch and Receive) Click" While standing in front of an electronic signboard which shows commercials of products and services, the user clicks a button on their RFID tag to receive information with the URLs of products and services shown in the signboard's multimedia presentation on their DoCoMo phone. This feature enables the user to view the webpage later, at their convenience.

"Buratto (Walk Around) Catch" This feature automatically emails area information as it detects the user moving about Roppongi Hills. The user receives information before actually entering a new area, because the system anticipates their movements. This area information is also cust to the user's specific interests.

Mobile Narrative

- Janet Cardiff
  - Missing Voice (1999)
  - Video Walk (2001)
  - Her Long Black Hair (2004

Location Based Art

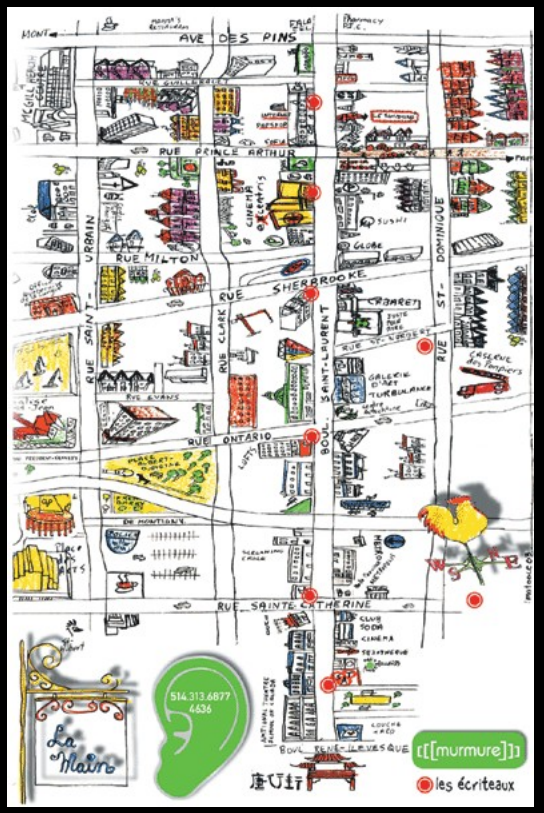
- “Dialtones – A TeleSymphony”
  By Golan Levin, Ars Electronica, 9/2001
  - Register mobile phone numbers (~500)
  - Assigned seats
  - Ringtones downloaded to keitai
  - Spatially distributed chords/melo
  - Waves of sound
  - Visualizations

  - http://www.flong.com/telesymphony/

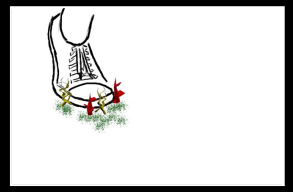
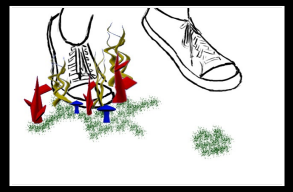
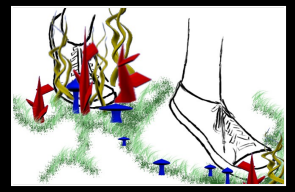
Location Specific Art

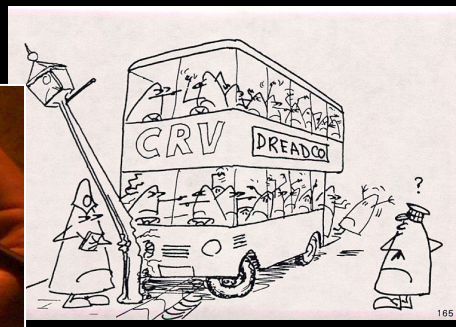
- Murmure Project (2003)
  - Shawn Micallef, James Roussel, Gabe Sawhney
    - an archival audio project that has collected stories set in specific locations throughout Vancouver's Chinatown.
    - At each of these locations, a [murmur] sign marks the availability of a story with a telephone number and location code.
    - Using a mobile phone, people can listen to the story of that place while engaging in the full physical experience of being there.
    - Some stories suggest that the listener walk around, following a certain path through a place, while others allow a person to wander with both their feet and their gaze.

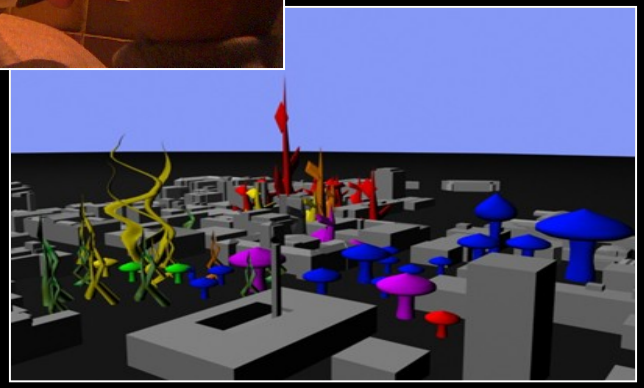
http://murmurtoronto.ca/



- Mobile Media Research Areas:
  - Current Projects
    - Location Based
      - WEM II
      - Patholog
    - Pervasive & Persistent
      - Zombie
      - Chôjô (Collective Responsibili Game)
    - Presence Awareness
      - SPECK
    - Embedded Narratives

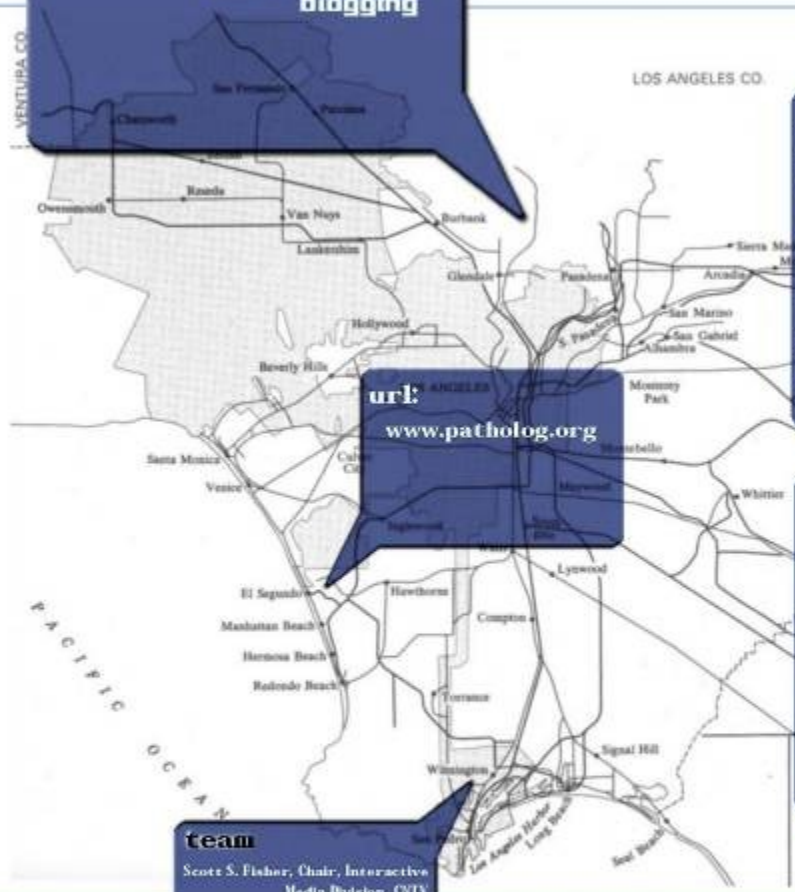




patholog

location-based blogging

walk. explore. publish.



The Patholog system allows users to access data embedded in the environment, explore that information, and publish blog-like entries based on content of particular interest.

Patholog users carry a GPS capable portable device with them throughout the course of their day. At any point, they may upload the path data collected via GPS to a server.

The server checks the x,y coordinates of each point on the user's path against a database of location embedded content. This content could vary widely, from location-specific news and crime reports, to images and video and user annotations.

Once the user has explored their path and made any annotations, they set up permissions that detail who can see this content, and publish the collection of various content and annotations into a new patholog.

The user is also given a visualization of their path, which is published as well. This visualization adds additional context to the user's path.

Based on which pieces of content the user's path has matched, the system brings up a web page that allows the user to explore the data related to their path. This information could alert them to a rock concert playing at a venue they walked by, or even a fragment of a story authored in scattered locations around the area. Whatever the data, the user can annotate any location that matches a location in the content database, or alternatively even annotate points on their path that didn't have other pieces of content already attached. These annotations then become separate pieces of content that can be viewed by other users, depending on permissions, just like any other piece of content.

Every path the user publishes is stored in a database. Much like a traditional blog, this archived information allows information to be stored and retrieved. By storing path data, however, the patholog system extends the typical archiving models by attaching content to physical locations. Because of the added location context, users are able to more quickly retreive archived content.

The archiving system will also enable new connections to history. We could track crime patterns in specific areas, or study the archives of patholog users living in San Bernardino before and after the Old Fire of 2003.

url:
www.patholog.org

team

Scott S. Fisher, Chair, Interactive Media Division, CNTV

MFA, Interactive Media =
William Carter
Todd Furmanski
Kurt MacDonald
Tripp Millican



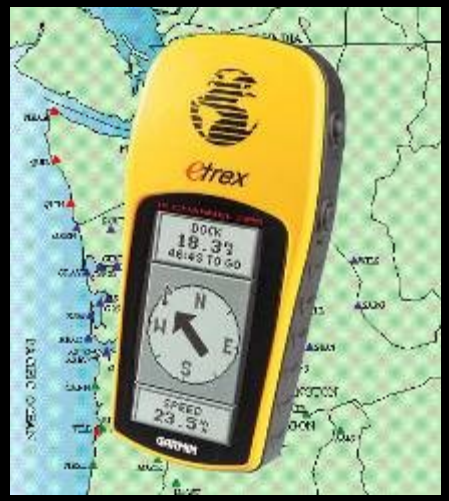


Annenberg Center for Communication

USC INTERACTIVE MEDIA

MOBILE MEDIA PROJECT .IMD @CNTV

patholog
location-based blogging



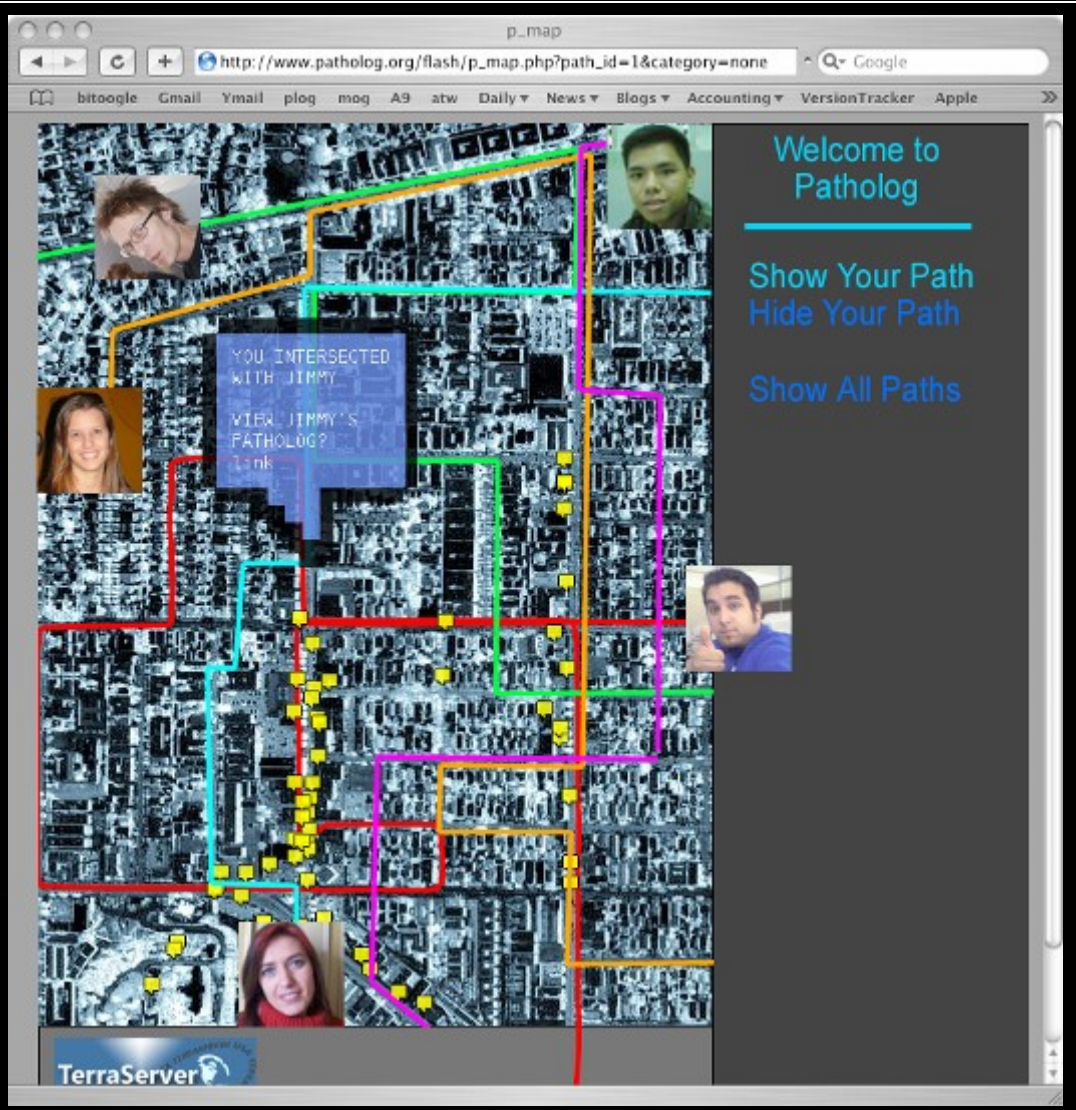
patholog
location-based blogging

Blog + Cameraphones + GPS = Patholog

patholog
location-based blogging

beta

Intersections



Chôjô: IMD:CNTV/IMSC Collaboration

A 3D virtual USC campus mobile game

Chôjô is a research collaboration between the Integrated Media Systems Center (IMSC) and the Interactive Media Division at the School of Cinema Television.

This project allows for an exchange of ideas and proficiencies between IMSC and IMD that allow for achievement not previously possible individually. Drawing from the particular strengths of both disciplines, this project focuses on contextualizing the traditional strengths of the Cinema School in the realm of digital media, while bringing an invaluable wealth of experience from the development of immersive technologies at IMSC.

PROJECT LEADERS:
Scott Fisher, *Director, Division of Interactive Media*
Victor LaCour, *Creative Director, IMSC*
Suyay You, *Research Assistant Professor, IMSC*

TEAM LEADERS:
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Monica Adjemian, *Undergraduate, CS*

MOBILE TEAM:
Prasanna Joshi, *Masters Student, IMSC*
Tripp Millican, *MFA Interactive Media, CNTV*
Kurt MacDonald, *MFA Interactive Media, CNTV*
Todd Furmanski, *MFA Interactive Media, CNTV*
Diego Borro, *Post-Doctorate Fellow, IMSC*

USC INTERACTIVE MEDIA

USC Interdisciplinary Collaborations

USC IMSC

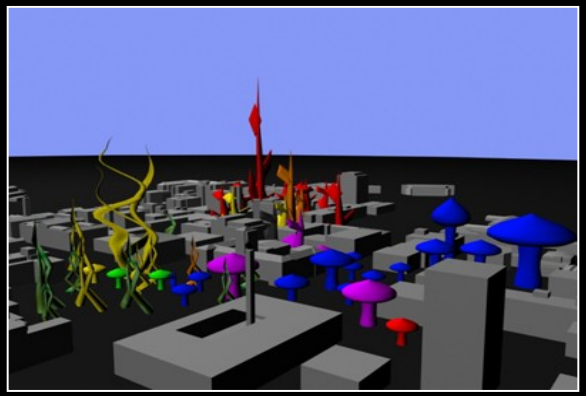
GAME OVERVIEW

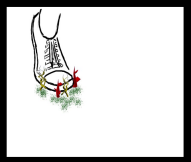
The goal of the research is to develop a virtual, persistent world that is embedded upon the physical USC campus. USC Students, using PDAs, can walk through the USC campus leaving behind virtual fragments, represented by small 3d Models. As they walk, they are able to create new objects, and peek inside the space they are helping to develop. As each object is dropped, it retains a set of unique behaviors, and will interact with other elements in the virtual world.
The result will be an emerging, complex series of ecosystems. In addition, users will be able to click on buildings from the PDA and access other embedded data such as the year the building was constructed or an event schedule.

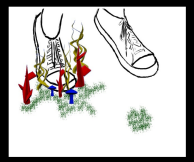
The Virtual Layer is accessed in two distinct ways; through a PDA and a centrally located 3D kiosk.

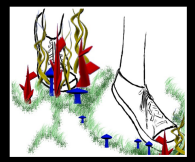
PDA View: The PDA view is the more extensive window into the virtual space. Users are presented with a 2D view that shows them a global perspective of the campus, with hotspots reflecting different objects, and the current state of each object. In addition, the PDA also offers a small 3D window that provides a local view into the world. Using these views, the user can then best decide how to interact with the space.

Kiosk View: From a Kiosk located in the middle of the USC campus, students without PDAs are offered a computer driven 3D walkthrough of the virtual layer.

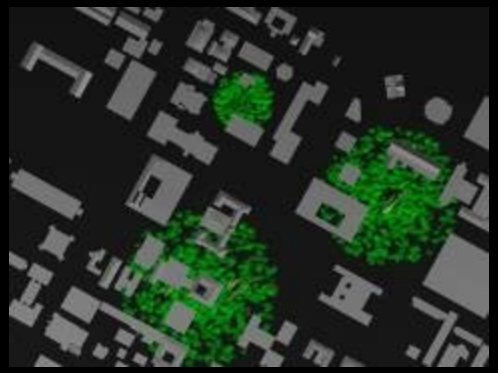


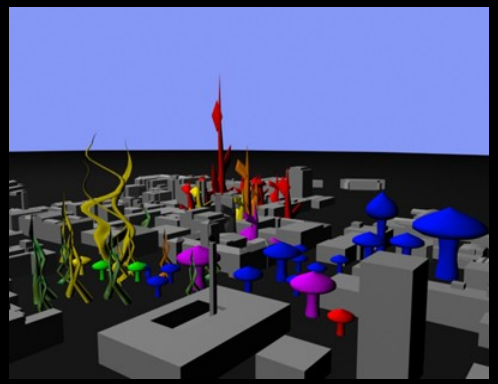






- Create a virtual world using the 3D USC campus map
- Open “windows” into that space through mobile devices
- Interact with the environment by moving across campus
- Encourage emergent development of “ecosystem”
- Develop new gameplay designs on top of the platform





- “Pick up” an object in the virtual environment
- Various plants, trees and crystals are available
- Adjust attributes with color sliders
- Walk around, create objects and observe the interactions
- Try to maintain the borders of your kingdom

- Mobile Media Research Areas: Presence Awareness
  - "SPECK" (2004) by Lin, Dillon, Brinker, Chen, Newman (IM MFA students)
    - Personal smart presence device that alerts you when a friend is near.
      - allows you to quickly and easily exchange information with other people
      - Simple and affordable, so it can be treated more as an accessory than a gadget
      - Glanceable, unobtrusive, and undemanding
      - Take advantage of existing social and trust networks, and trying to maximally empower users while retaining ease of use
      - Local presence, both to simplify the device and to mitigate privacy concerns
    - A flexible platform that can take a variety of form-factors and that can be customized for each user's personality and lifestyle
      - Uses Class 1 Bluetooth wireless technology
      - both an accessory device as well as a software/communications platform.
      - Speck devices can interact with each other, or with Bluetooth enabled phones and PDA that are running the Speck client. (J2ME MIDP)

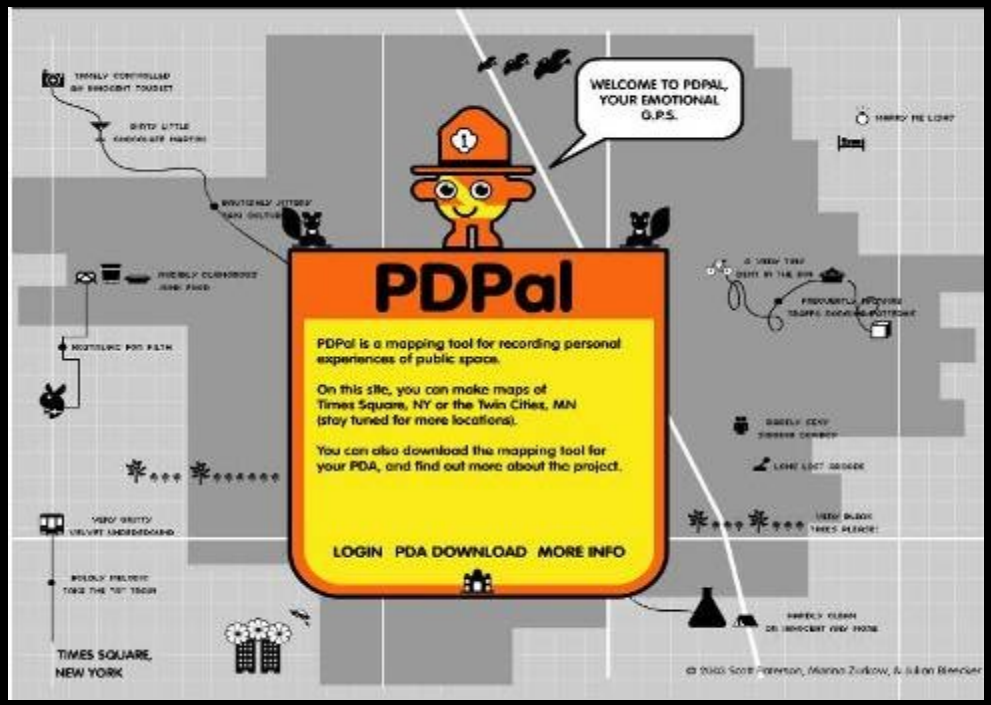
speck

School of Cinema - Television

DIVISION OF INTERACTIVE MEDIA

- Mobile Media Research Areas:
  - Embedded Narratives
    - Integration of location-specific story and live action
    - Frameworks for location-specific narratives in urban environments (“Re-placing Hollywood”)
    - Personal Archives

- "PDPal" (2002-3)
  - Julian Bleecker, Assistant Professor, Interactive Media
  - Commissioned by Walker Art Center, MN & Creative Time, NY



Personal Archives/Subjective Cinema

- “MyLife Bits” (Gordon Bell, Microsoft Research)
  - “A lifetime store of ***everything”***
  - Examples:
    - record every bit of data relating to a business venture
    - document every stage of their child's development
  - Database application as part of the MS operating system

- “LifeLog” (DARPA/US Government)
  - aims to capture and analyze a multimedia record of everywhere a subject goes and everything he or she sees, hears, reads, says and touches
  - be able to trace the "threads" of an individual's life in terms of events, states, and relationships.
  - be able to find meaningful patterns in the timetable, to infer the user's routines, habits and relationships with other people, organizations, places and objects

- “Casual Photography” (HP Bristol)
  - camera that fits on the bridge of the nose piece of a pair of eye glasses and can store 20 images a second onto a very large compact flash card or a 1.8-inch hard drive
  - always-on camcorder stores the most recent five minutes of video in "short term memory”
  - algorithms that can figure out the photographers' head motion at any point and from that, infer what might be the best way of representing that sequence of images.

USC School of Cinema - Television

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